FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS.

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

Dec. 2 ... **Lectures, "Airship Piloting," by Major G. H. Scott, C.B.E., A.F.C., "Airship Mooring," by Flight-Lieut. F. L. G. Butcher, before R.Ae.S., at Royal Society of Arts**

Dec. 16 **Lectures, "Possible Developments of Aircraft Engines," by Mr. H. Ricardo, and "The Instalment of Aeroplane Engines," by Mr. A. J. Rowledge, before R.Ae.S, at Royal Society of Arts**

EDITORIAL COMMENT

AT last we seem to be getting within measurable distance of the utilisation of the big rigid airships constructed during and since the War. For a considerable time past—since very shortly after the Armistice, in fact—the tongue of rumour has been very busy regarding these vessels. All that has really been allowed to transpire is that at one time a powerful group of the armament and shipping interests seemed likely to come to terms with the Government, and to take over the ships with a view to running commercial services with their assistance. Whatever negotiations were gone through, they failed to materialise into anything concrete, and no reason has ever been given, though we understand that the terms on which the Government proposed to hand over the ships to private enterprise were not such as to commend themselves to those who were negotiating for the other side. In all probability, the Government would now be glad to get the ships off their hands on very much better terms than they would have accepted a year ago, but it does not seem that the other interests are as keen about the possession of airships as they were then. That, however, by the way.

Commercial Airship Services

It is now announced that four ships—the "R.36," "R.37," "L.71," and "L.64"—are being handed over to the Civil Aviation Department of the Air Ministry, while "R.33" is being temporarily lent by the R.A.F. It is intended at once to proceed with experimental work in various directions in order to gain definite experience which is likely to be useful in running commercial airship services in the future. The big experimental airship station at Pulham is to be the headquarters of the experiments, which are to be mainly directed to obtaining information as to mooring-out, meteorology, and wireless direction-finding. "R.36" is to be used during the next few months for long-distance demonstration flights, the first of which will probably be to Egypt and back. There is no intention at all of the Air Ministry embarking upon commercial services—the sole purpose of the move which is being made is to gain complete information as to the possibilities.

The Ministry is to be congratulated upon its enterprise. We have no really reliable data of the behaviour of big airships in everyday commercial use, except such figures as we might be able to obtain from Germany, and which might not be the exact guide to conditions that we shall obtain from the experimental services to be carried out from Pulham. The ships are there, and are nothing but white elephants to the Government. If they cannot be utilised they might just as well be scrapped out of hand, since they represent a considerable outlay in upkeep which the country cannot afford unless they are ultimately to be turned to some useful commercial purpose. We are confident that the experiments will amply demonstrate that it is possible to run commercial airships at a profit. As a matter of fact, we are told by one who has authority of no uncertain kind to back the statement, that it would actually be possible to run

airship services over certain long-distance routes, such as to Egypt and India, at rates within a little of steamer fares, and still make a profit. Whether that is a too sanguine estimate we shall learn before long through the medium of the projected experiments. In the meantime, we can only again congratulate the Air Ministry upon a very wise and timely move.

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The Future of Air Mails

Last week the House of Commons was asked to endorse a contract between the Postmaster-General and the London and North-Western Railway Co. for the carriage of the mails between England and Ireland for a period of twenty years. The contract gave rise to considerable discussion, particularly with reference to the possibility of carrying at least a part of the mail matter by air. The portions of the debate which turned about this latter part of the question are printed in another page of this issue of FLIGHT.

It will be gathered from reading the report in question that the Postmaster-General was not at all unsympathetic in his attitude. He pointed out that air mails are at present in operation between London and Paris, Amsterdam and Brussels, and that the question of air mails generally is not being overlooked by the Post Office. The atmospheric conditions were, he said, much more favourable in the case of these existing services than those which obtain on the Irish route. Not only so, but the essence of the Irish mail is that it should go by night. At present night flying cannot be done at the moment, and therefore it was out of the question that the mails could go by air. He went on to say that if, during the next twenty years, the mail service by air should become a practical proposition, there was provision made in the contract for making a corresponding reduction in the amount to be paid to the railway company for the fewer mails they would have to carry.

Undoubtedly, aerial enterprise is gravely prejudiced by the undeniable fact that night-flying is, for the present, too uncertain to be commercially practical. We have a considerable distance to travel before this can be entirely rectified. There are two main difficulties in the way of night services. One of these can be overcome with comparative ease, but the other is one which will need research and discovery to eliminate. The first is bound up with the provision of proper navigational lights for the guidance of the aerial traveller. That is a question with which we dealt at some length a few weeks since, so there is no necessity for us to traverse the question afresh. Given properly illuminated landing grounds and adequate leading lights, night-flying in clear weather need be no more dangerous or difficult than flying by day.

The most serious enemy of the night-flying pilot is fog or mist, and there is a great deal of it to contend with on the Irish mail route. It is as well to admit at once that there does not seem to be overmuch possibility of the maintenance of a regular and punctual air mail service over that route until fuller knowledge, and possibly some revolutionary discovery, shall make it possible to carry on with ease flying services in fog or thick weather. Passing from the question of this one specific service to glance at the question at large, while we are pleased to note that the Postmaster-General is generally sympathetic to the idea of carrying the mails by air, we still feel regret that he does not seem to get any closer to the idea that, where air mails are in regular operation and are keeping time, as is the case between London and Paris, all first-class mail matter should automatically be conveyed by aircraft. As we have often urged in these columns, it is only by so doing that the Post Office can convince the public that aerial transport is at once safe and speedy, the while it affords a very much needed measure of support to civil aviation.

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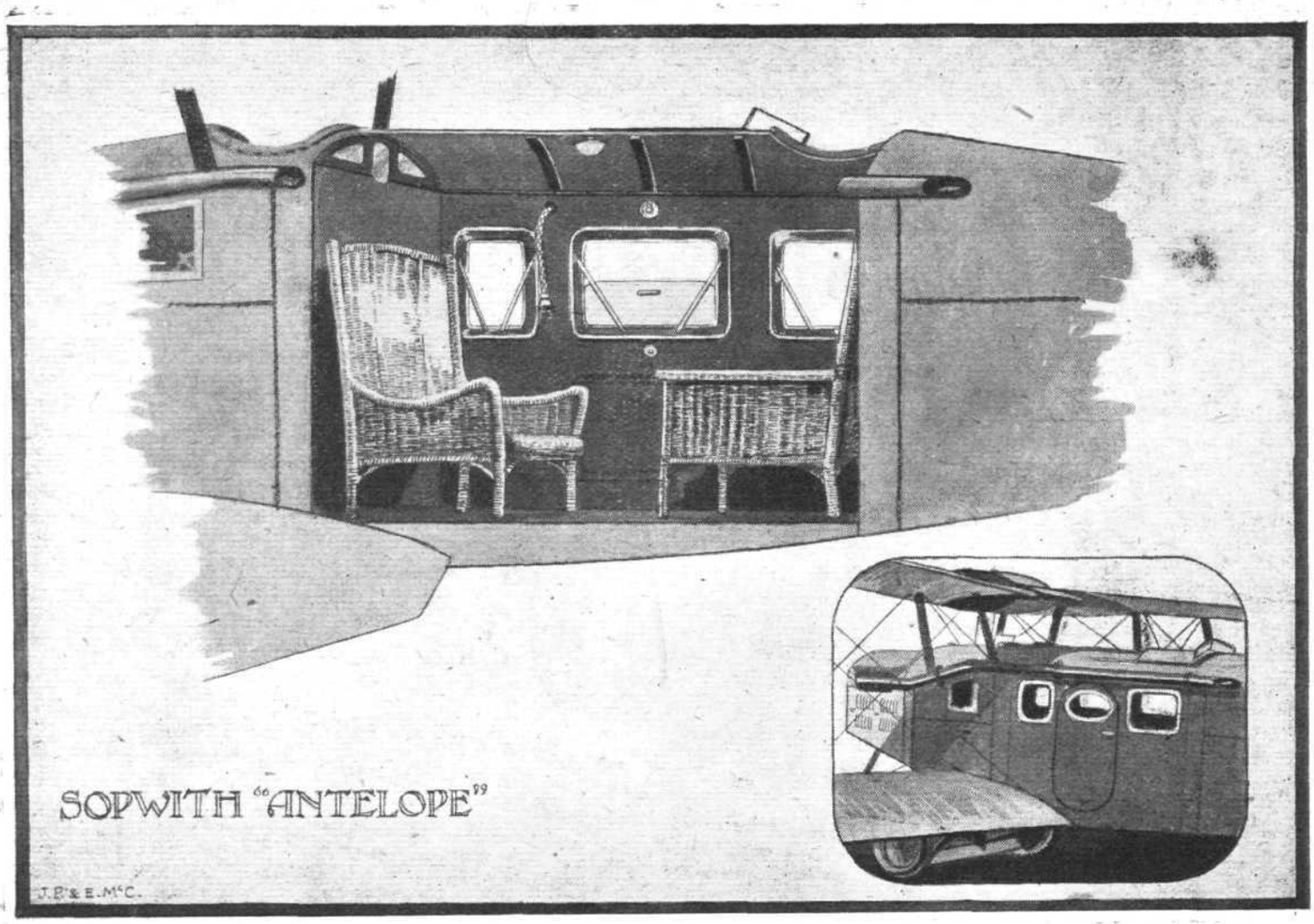
The Enemies of the R.A.F.

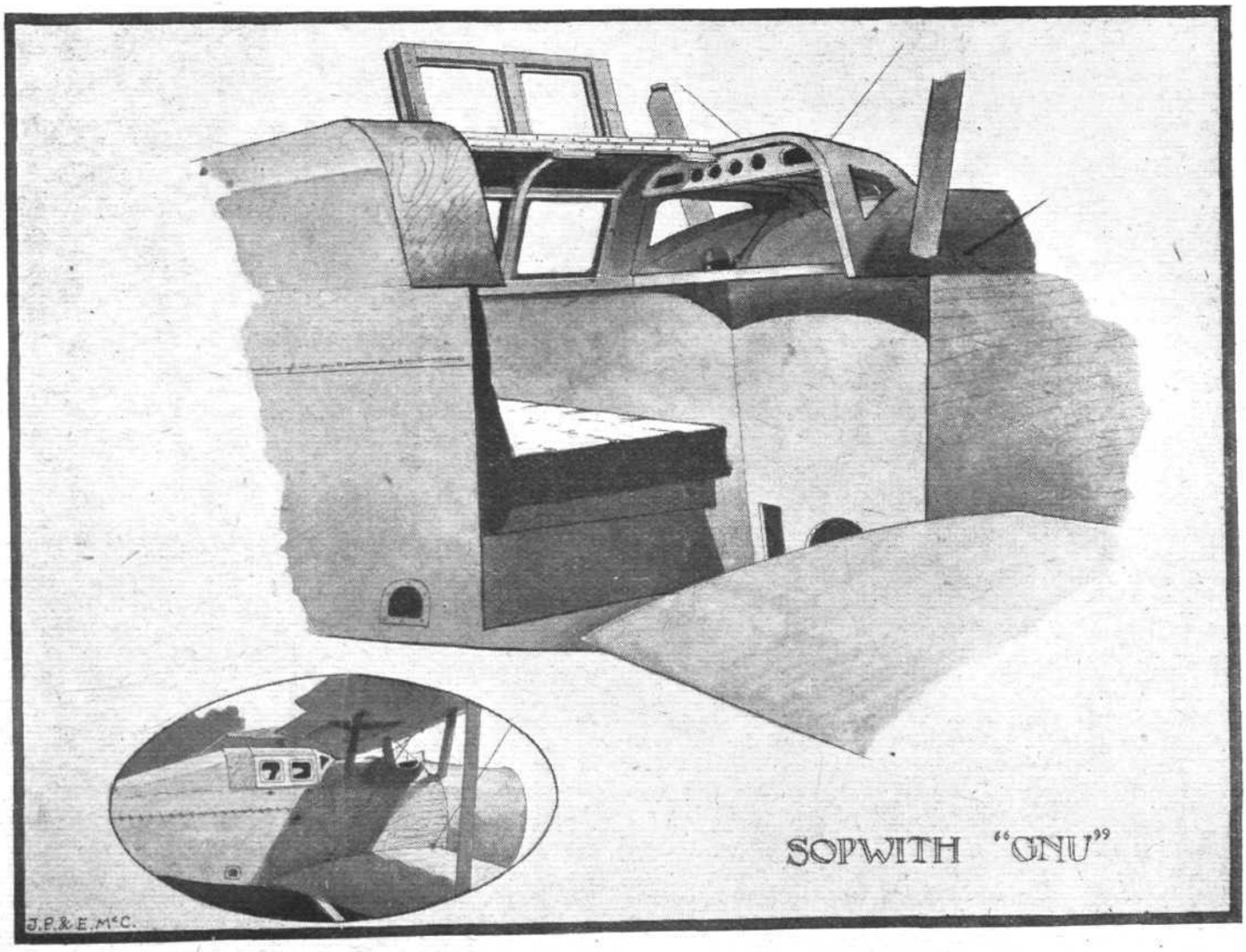
It is very evident to the interested observer that we have not even yet done with the type of naval and military critic who would like to see the separate Air Force scrapped and the control of the Air Services reverted to the Admiralty and the War Office. From time to time there is heard a rattling among the dry bones which tells us much. For instance, at a recent City dinner, Sir Percy Scott fell foul of the Government and naval policy during the War. He expressed the view that the old naval standard had gone and asked what the new one was to be. The only decision come to during the War, he said, was to take away from the Navy its most vital arm, both of attack and defence. This, he believed, was a terrible blunder. So distinguished a naval officer as Sir Percy Scott is entitled to his opinions, but we would point out that very many others as distinguished hold views which are diametrically opposed to those he expressed the other night.

It is pertinent to remark that after the system of two Services had been given an exhaustive and lengthy trial under war conditions—we had been at war for three-and-a-quarter years when the change was made—Parliament acted on the advice of those who knew and combined the R.N.A.S. and the R.F.C. into one single and distinct Service. It was not until this had been done that we attained to absolute superiority over the enemy in the air. We need not go over the whole sorry story of opposing interests in the two Air Services, fighting against each other to secure machines and material in competition, or the malign influences this competition exercised over efficiency. Nor is there need to do more than to refer to the petty jealousies manifested between the Services—jealousies which were inseparable from the dual control which existed and which did much to impede the common task of beating the enemy. All who had anything to do with the aerial side of the War, or who followed its history from inside, know to what we refer. The plain fact remains to refute the arguments and the diatribes of the champions of the bad old order of things that it was not until the R.A.F. was constituted that our aerial forces came on to an efficient basis and evolved a real *esprit de corps* peculiar to the Air Service.

In war and in peace the R.A.F. has most completely justified itself and to retrograde as Sir Percy Scott and others would apparently have us do would be a capital mistake. Fortunately, those who have the ultimate say in the matter realise this, and there does not appear to be any immediate danger of the reactionaries having their way. There is one point in which Sir Percy Scott is certainly wrong if his utterances have been correctly reported. Taken literally, he professes to say that the Air Service was taken away from the Navy during the War. It most certainly was *not* taken away. Not a machine, not a pilot, not a mechanic, was "taken away" in any true sense of the word. Administrative matters



MODERN CABIN MACHINES: IX. The Sopwith "Antelope."



MODERN CABIN MACHINES: X. The Sopwith "Gnu."

were transferred to the Air Ministry, but command remained with the Navy and the Army just as it had been before the change and as it remains now. What did happen was that the ruinous competition, which had been the rule before, ceased, and supplies came forward and were allotted with due regard to the requirements of both Services. However, there is no need to pursue the subject further. There is to be no change in the existing order of things. So much was vouchsafed by Mr. Bonar Law in the House recently, when, in reply to a question by Major Glyn as to whether representations had been made by the Admiralty and the Army Council to the effect that it is advisable to return to the separate Air Services, he stated with emphasis that the answer was "in the negative."

* * *

Air Estimates Savings

In consequence of the countermanding of orders for experimental machines and the non-allotment of a part of the prize-money allocated to the Air Ministry trials, the Research Department will spend over £100,000 less than the sum provided for in the year's Estimates. As the specific objects for which these sums were allotted have been abandoned, the money remains in the Treasury, and will, in the ordinary way, go to the Sinking Fund.

While we recognise to the full the pressing need which exists for economy in every department of the nation's finance, we cannot help feeling that this money could have been very usefully employed in the encouragement of civil aviation, either by way of mail-carrying contracts or in the subsidising of the industry in one or more of the ways which have been recommended by the Advisory Committee. It is admitted by everybody who has given the subject any serious thought that a flourishing aviation industry is essential to the future safety of the country and the Empire. The Air Service has the great advantage over the other Services of a great capacity for reinforcement from the civil side in times of emergency. Its true line of development lies, as we have so consistently urged, in the creation of a powerful commercial industry which can be called upon almost at a moment's notice to form a vast reserve to the fighting Air Service. That being so, it would be the truest economy to foster such an industry by every reasonable means, and we submit that the spending of such a surplus as this we are discussing comes well inside the definition.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN NOVEMBER 21 AND NOVEMBER 27, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying: Mails	No. of flights carrying: Goods	No. of journeys completed†	Average flying time	Fastest time made by	Type and No. (in brackets) of Machines Flying
						h. m.		
Croydon-Paris	15	25	5	11	11	3 21	Airco 16 G-EALM (2h. 38m.)	A.16 (2), A.18 (1), B. (3), Bt. (1), G. (1), N. (1), V (1).
Paris-Croydon	16	31	3	12	13	2 17 3 6	Airco 4 G-EAVL (1h. 47m.)	A.4 (1), A.16 (2), A.18 (1), B. (4), G. (1), N. (2), V. (1).
Cricklewood-Paris ...	7	16	1	6	6		Airco 9 G-EAUN (2h. 30m.)	A.4 (1), A.9 (2), A.18 (1), H.P. (1).
Paris-Cricklewood ...	6	18	—	3	5	2 37	Airco 4 G-EAVL (2h. 2m.) ...	A.4 (1), A.9 (2), H.P. (3).
Croydon-Brussels ...	1	—	1	1	1	2 55	Airco 9 O-BEAU (2h. 55m.)	A.9 (1).
Brussels-Croydon ...	2	—	2	2	2	2 29	Airco 9 G-EATA (2h. 28m.)	A.9 (2).
Cricklewood-Brussels ...	3	2	2	2	3	2 38	Airco 4 O-BALO (2h. 33m.)	A.4 (2), A.9 (1).
Brussels-Cricklewood ...	2	2	2	2	1	1 45	Airco 4 O-BELG (1h. 45m.)	A.4 (2).
Totals for week ...	52	94	16	39	42			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys.

A.4 = Airco 4. A.9 = Airco 9 (etc.). Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. N. = Nieuport. P. = Potez. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Air Post of Banks; Air Transport and Travel; Co. des Grandes Expresses Aériennes; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij: Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

Spanish Decoration for Flying Officers

IT is announced that the King has granted to the following officers of the Royal Air Force, who, with the exception of Flight-Lieut. Payne, have been demobilised, licence and authority to wear decorations of the Order of Military Merit conferred upon them by the King of Spain:—

Class III.—Wing-Commander William Dawson Beatty, C.B.E., A.F.C.

Class II.—Flight-Lieut. Lionel Guy Stanhope Payne, M.C., A.F.C.

Class I.—Capt. Harris Holberton Square; Lieut. George Miller Jeffrey; Lieut. Anthony Conning Kilburn; Lieut. Ian Patrick Anderson; Lieut. George Murray, M.C.

Civil Airship Experiments

THE Air Ministry announces:—

The Department of Civil Aviation has agreed temporarily to take over all airships, bases and material, surplus to service requirements, in order to carry out experimental work of an operational character, such as mooring-mast tests and flights of primary importance, to gauge the ships' capacity for commercial operation.

It is hoped that surplus airships will ultimately be handed over on approved terms to a private company to operate, and the results of these experiments and the knowledge and experience obtained will be available to any such company.

[We refer to this matter on page 1227.—ED.]

FLIGHT
THE AIRCRAFT ENGINEER AIRSHIPS

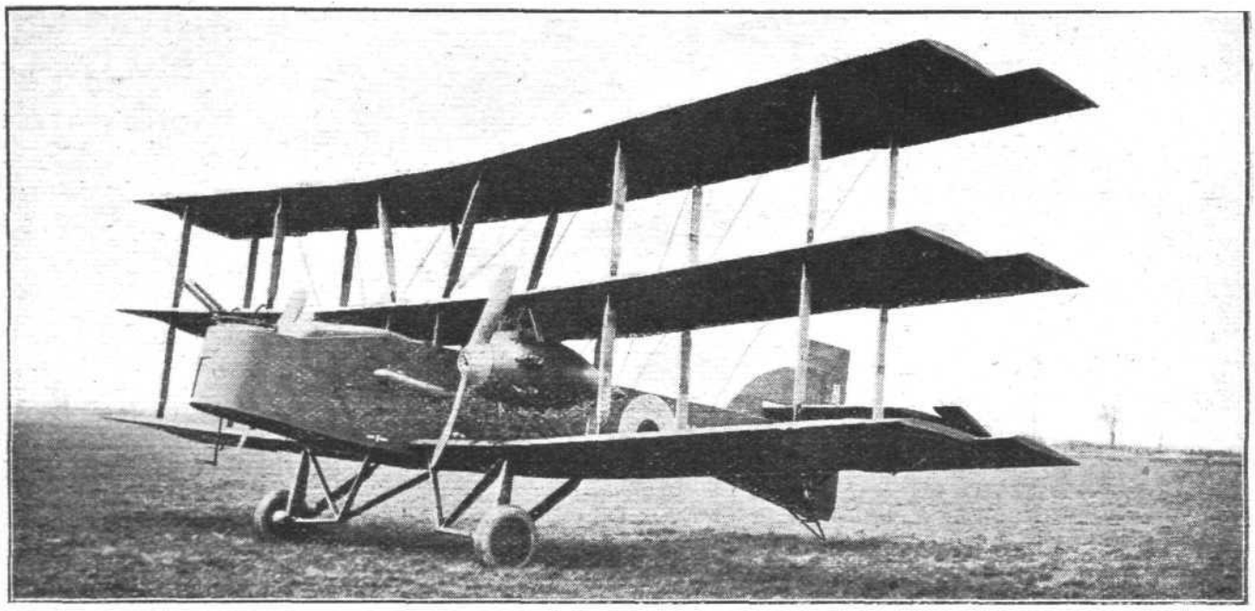
THE NIEUPORT "LONDON" NIGHT BOMBER

AMONG the new types of machines in course of construction or contemplated when the War finished were several of more than passing interest. Of these some never came into being, others were produced in twos or threes where scores had been planned, according to the stage of completion at the signing of peace. Some of these machines have already been described in this journal, others are still being experimented with by the Air Ministry, and publication of particulars is not permitted.

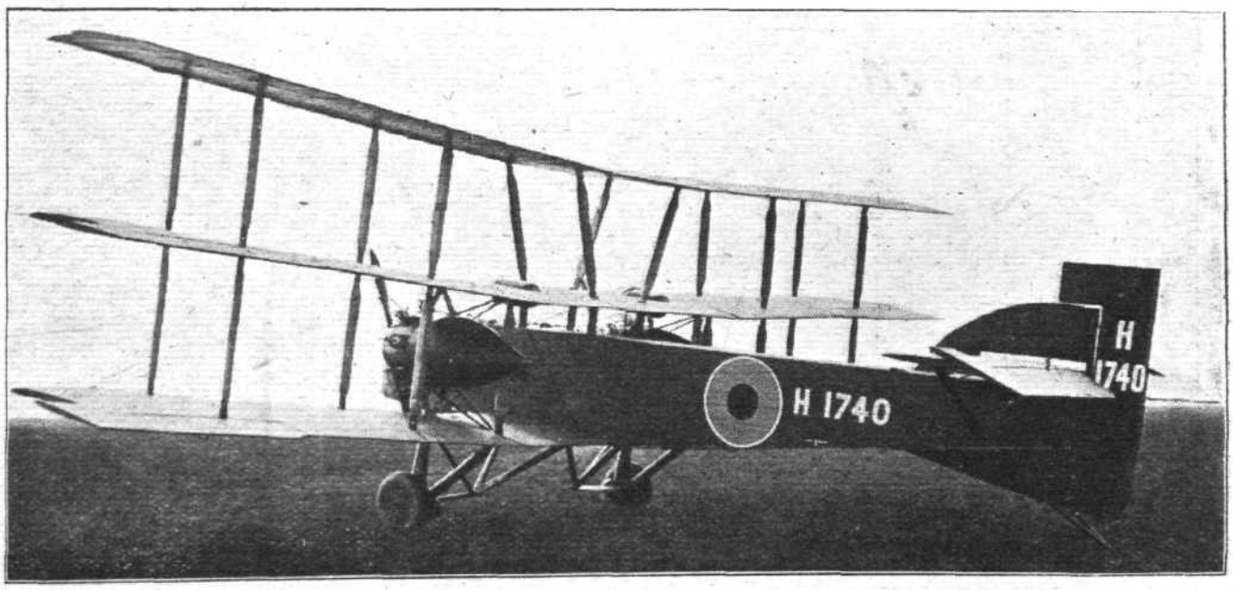
Among the machines which, although designed for War purposes, could easily have been converted into very useful commercial machines, especial interest attaches to the "London" triplane, designed and built by the Nieuport and General Aircraft Co., Ltd., of Cricklewood, on account of several unusual features which would appear to have a very special bearing upon the construction of commercial aircraft. We understand that two of these machines are now being tested by the Air Ministry staffs at two different air stations, but although permission has been granted to publish a description, no particulars regarding results of test are yet available. Before being handed over to the Air Ministry for exhaustive tests, the machines were, however, tested by the firm's test pilot, Lieut. Tait-Cox, who found that they handled very nicely in the air, it being possible to fly them "hands off," and also to fly level with only one engine running.

Designed by Mr. H. P. Folland, chief engineer and designer of the Nieuport and General Aircraft Co., as a short-distance night bomber, the "London," as the machine is called, has not a very long range, about 200 miles, but carries a very useful load of bombs over that distance, *i.e.*, approximately 2,000 lbs. The triplane form was chosen from a number of considerations. For a given area probably the triplane form is more manœuvrable than is a biplane of the same area, at any rate when it comes to fairly large machines. Also the question of housing is simplified by the shorter span of the triplane. Again, from the practical point of view, the shorter wings of a triplane do not call for such long lengths of timber, which are difficult to obtain.

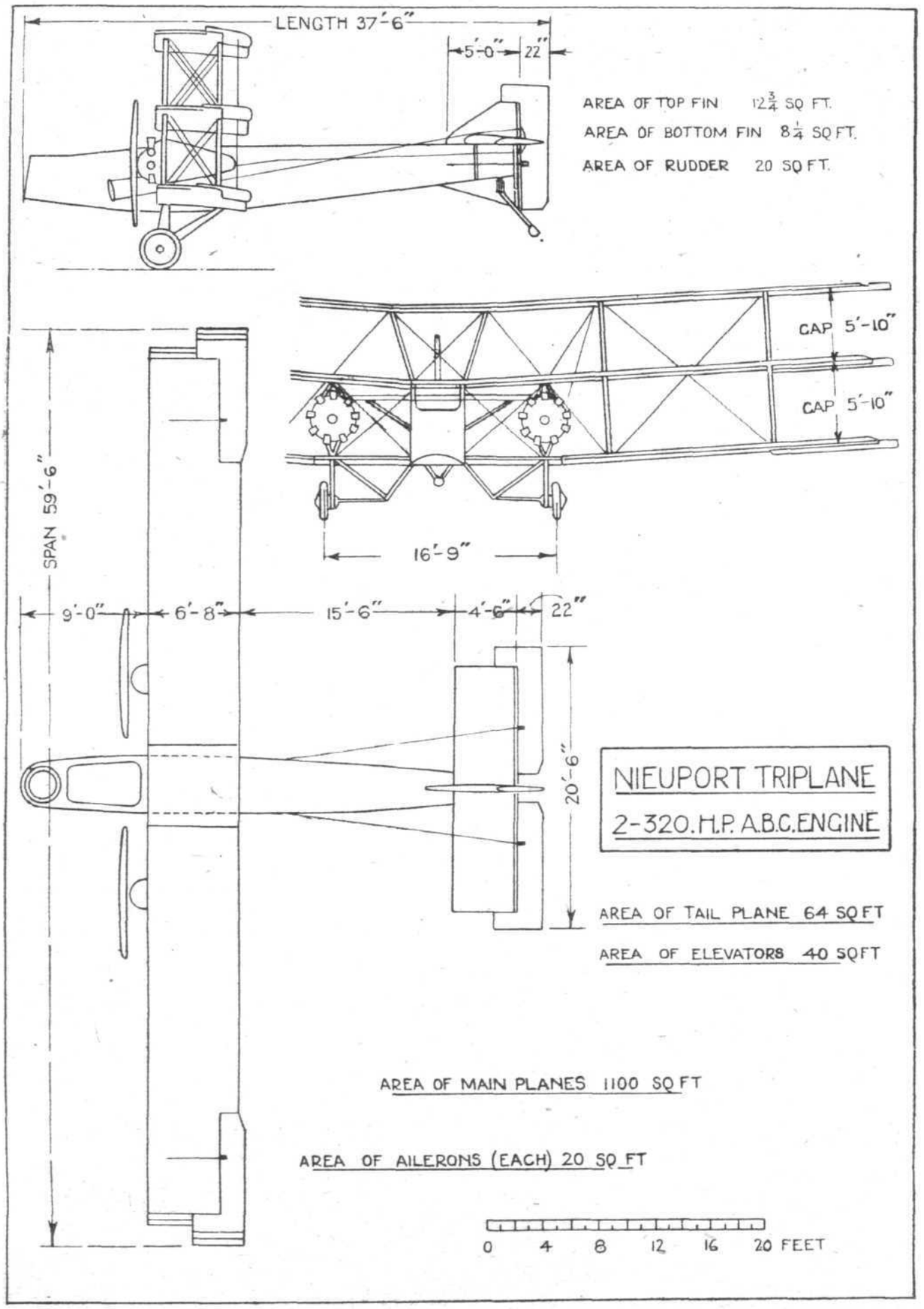
Apart from these general considerations, the designer has given a very great deal of thought and attention to the detail construction, which is such as to lend itself to quick and cheap production by a great percentage of unskilled labour. Not only so, but only such materials as are always easily obtainable, and at low cost, have been employed in the construction. For instance, the *fuselage* is really nothing more nor less than a glorified packing case. It is built almost entirely of moderate quality woods such as deal, pine, and cypress. The attachment of the various members to one another is by means of nails, brass wire sewing, wood pegs, and glue, thus eliminating



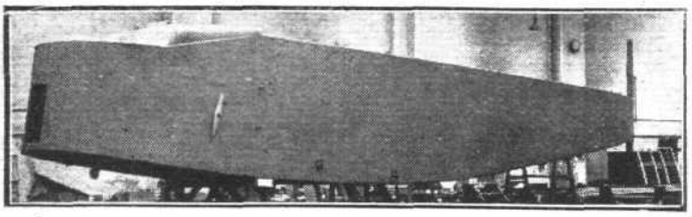
THE NIEUPORT "LONDON": Three-quarter front view



THE NIEUPORT "LONDON": Three-quarter rear view



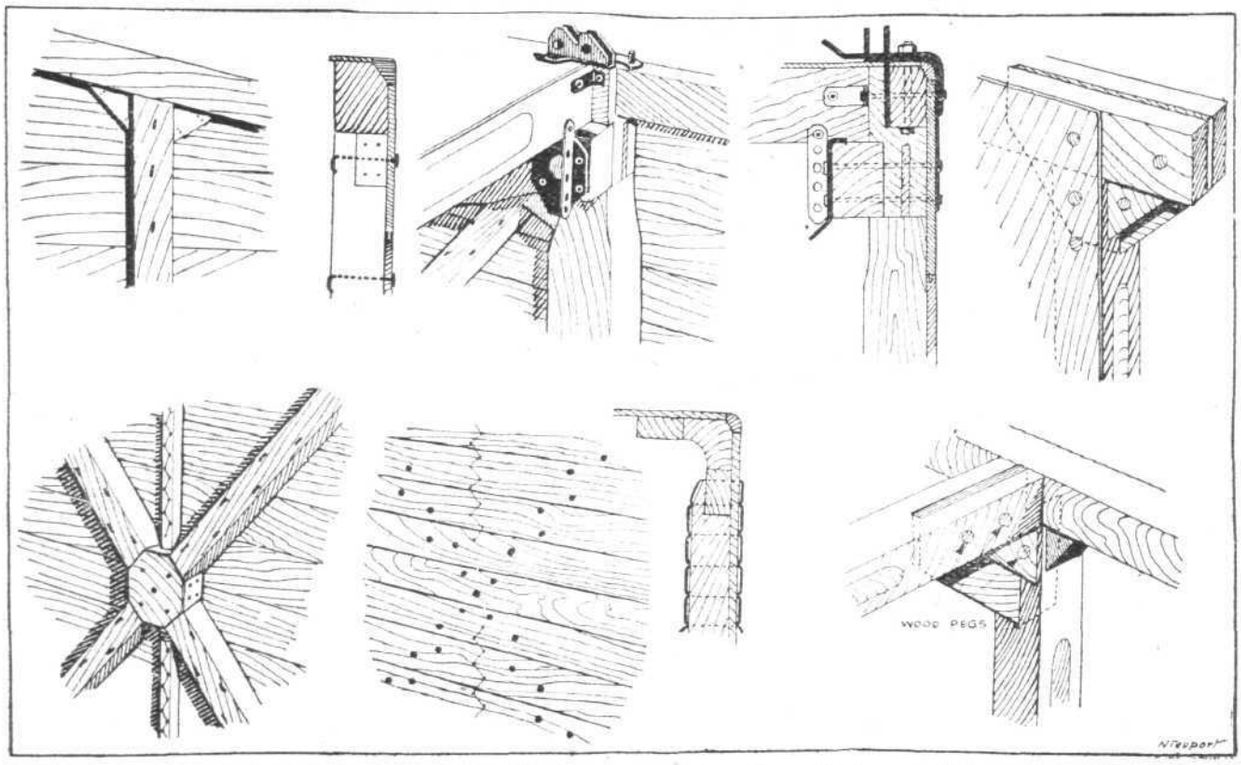
THE NIEUPORT "LONDON": Plan, front and side elevations to scale



THE NIEUPORT "LONDON": Three-quarter front view of the *fuselage*

the use of bolts and nuts or wood screws which are (or were when the design was got out) costly and difficult to obtain in sufficient quantities. The few metal fittings which are required for the attachment of wires, landing gear, etc., are of the simplest possible form, and are generally made from ordinary mild sheet steel without the necessity of using press tools.

reverse. To produce a first-class aeroplane out of such materials is an achievement of which the designer may well be proud, and amid the wartime spirit of "never mind the cost" it is quite refreshing to come across an instance where cost has been seriously studied. This is one of the reasons why the machine is of such extraordinary interest when viewed from a commercial point of view. As for the success of this construction, it is perhaps too early to venture an opinion until time has got in its work, but in the meantime it might be mentioned that an experimental *fuselage* of this construction was made, and on testing to destruction gave very good results. It was then thrown into the yard, where it was subject to wind and rain, and when last we saw it there, a couple of months ago, it did not look much the worse for its "open-air life," apart from the fractures caused by the destruction tests. There would therefore be grounds for supposing that in actual use such a *fuselage* might stand up to wear and tear very well, and as its weight, although naturally on the heavy side, is not such as to be prohibitive to its use on a commercial

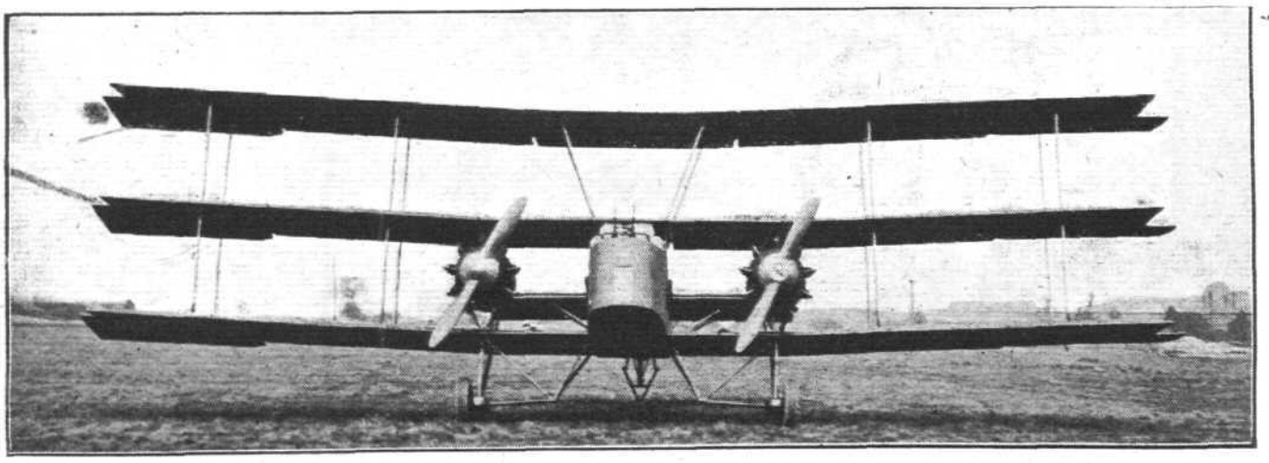


THE NIEUPORT "LONDON": Some detail sketches of the "packing-case" *fuselage* construction. Note the use of brass wire sewing and copper nails turned over on inside.

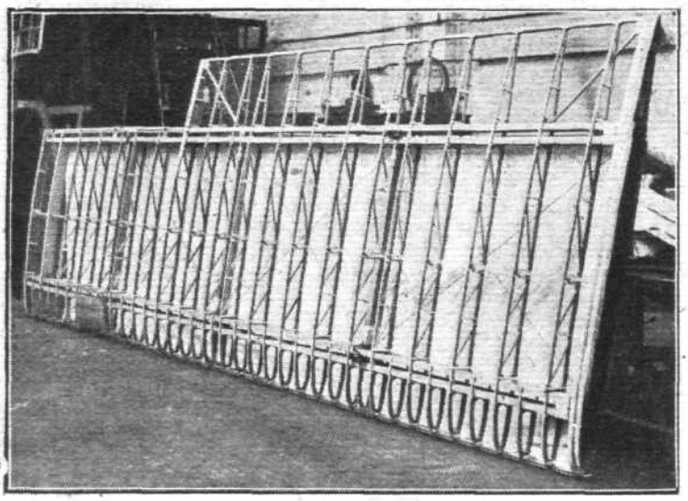
Mention may also be made of the fact that extensive use has been made of tubular rivets, which wherever possible take the place of bolts and nuts. Finally, the covering takes the form of tongued-and-grooved matchboarding, so that it will be seen that our reference to the "packing-case" construction is not altogether amiss. We would point out, however, that this is said in no derogatory sense, quite the machine, it seems well to place on record some detailed reference to the principles employed in the construction, not only of the *fuselage*, but also of the wings, the details of which are also, in many cases, different from usual practice.

The "Packing-Case" Body

Fundamentally the body consists of four *longerons*, connected by vertical and horizontal struts. There is no bracing in the

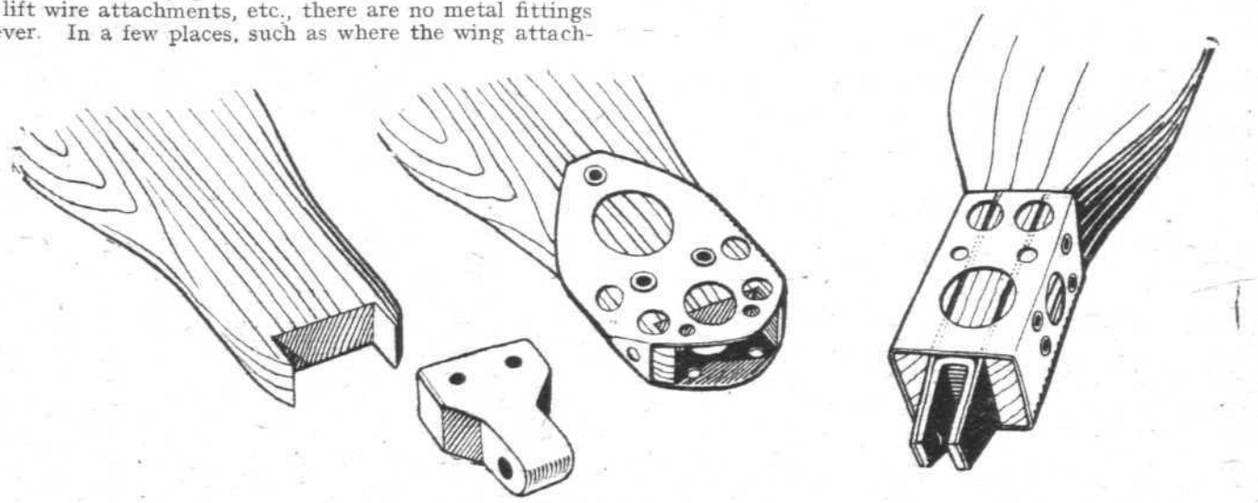


THE NIEUPORT "LONDON": Front view

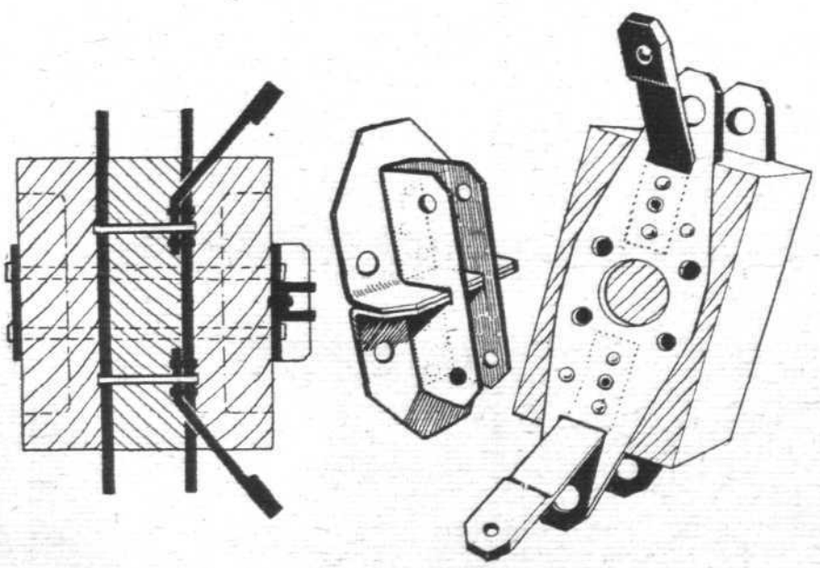


One of the wings of the Nieuport "London"

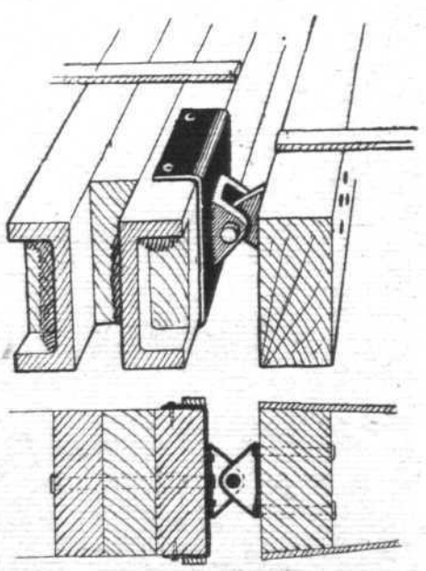
accepted sense of the term, the outer covering performing the function of the usual diagonal wire bracing. The manner of joining the struts to the *longerons* and to one another is indicated in some of the accompanying sketches. The exact details of these joints vary somewhat from point to point in the body, but generally speaking the joint takes the form of triangular pieces of three-ply wood, housed in slots in the struts and secured by glue and wood pegs. Except where occur lift wire attachments, etc., there are no metal fittings whatever. In a few places, such as where the wing attachments occur, the bracing is reinforced by diagonal struts (longitudinal and transverse). The methods of attaching the planking to the struts is indicated in some of our sketches. In some places this attachment takes the form of copper nails driven through struts and planking and turned over on the inside. At other points a stitching of brass wire is used instead of the nails. The planking, which, as already mentioned, is tongued-and-grooved, is laid on longitudinally, and finally a doped and varnished fabric cover encloses the whole of the *fuselage*. In spite of the fact that the planking is about $\frac{1}{4}$-in. thick, the body is not excessively heavy, and during some tests to destruction it withstood a concentrated load at the point of attachment of the rear wing spars of 8,650 lbs. before fracturing. For this test the body was supported at each end, and the load applied at the point mentioned. The maximum deflection at the point of application of the load was .82 in. It should be pointed out that during this test an accident occurred which undoubtedly caused failure earlier than would otherwise have happened. The test was carried out by stages, and when stage 9 had been reached it proved necessary to lift the load in order to insert a piece of packing. The load at this stage was 8,650 lbs. and when it was removed the *fuselage* made a complete recovery, all but a deflection of .05 in., which was thought to be accounted for by the settlement of the supports. On lowering the load again after insertion of the packing piece, one side of the sand-box gave way, with the result that the whole load dropped at least $\frac{1}{2}$ in. The effect of this was to produce an earlier fracture than if the whole load had been gradually applied, and the figure of 8,650 lbs. therefore probably does not represent the actual breaking strength of the body. When it failed the fracture occurred along the tongued-and-grooved portion of



THE NIEUPORT "LONDON": Interplane strut fitting. Note recess in end of strut for aluminium packing pieces. On the right a chassis strut fitting



THE NIEUPORT "LONDON": Sketches of the very substantial spar fittings

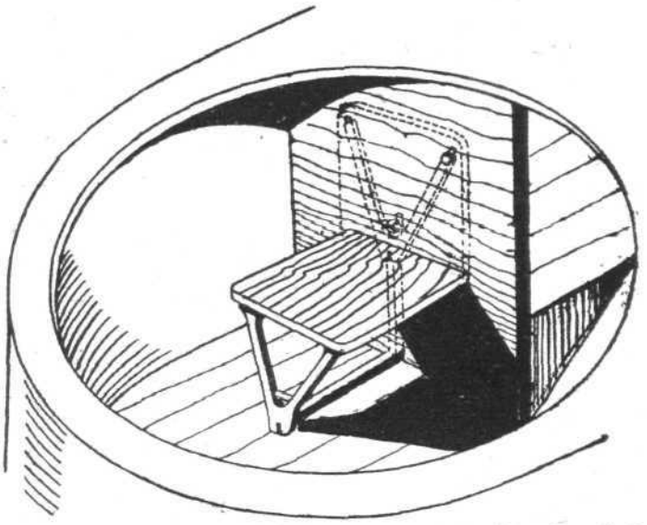


THE NIEUPORT "LONDON": Sketch of *aileron* hinge

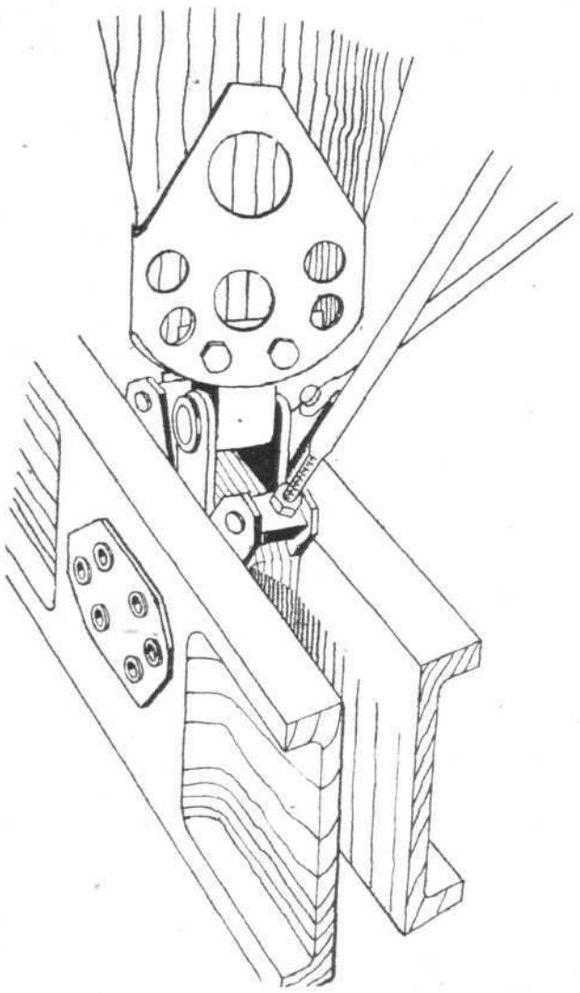
the front part of the *fuse age*, fracture evidently being caused by shear arising from bending. The load of 8,650 lbs. corresponded to a factor of safety of 4.65 on normal tail skid loading, and to a factor of safety of 6 on normal tail loading. The *fuselage* was also tested for torsion by being laid on its side on supports coinciding with rear and front spars, and having applied to its fin post a load measured on a spring balance. This method of testing was such that the rear portion of the *fuselage* was subject to a combination of torsion and bending. The test was stopped when the load applied was 600 lbs. as it was desired to use the *fuselage* for other tests, and it was considered that the load was far in excess of what would normally be met with in actual flying. The bending moment for the 600 lbs. loading was 144,600 lb. inches and the twisting moment 24,300 lb. inches. The angle of twist was then one-half of a degree, so that the body must be considered very rigid.

The Main Planes

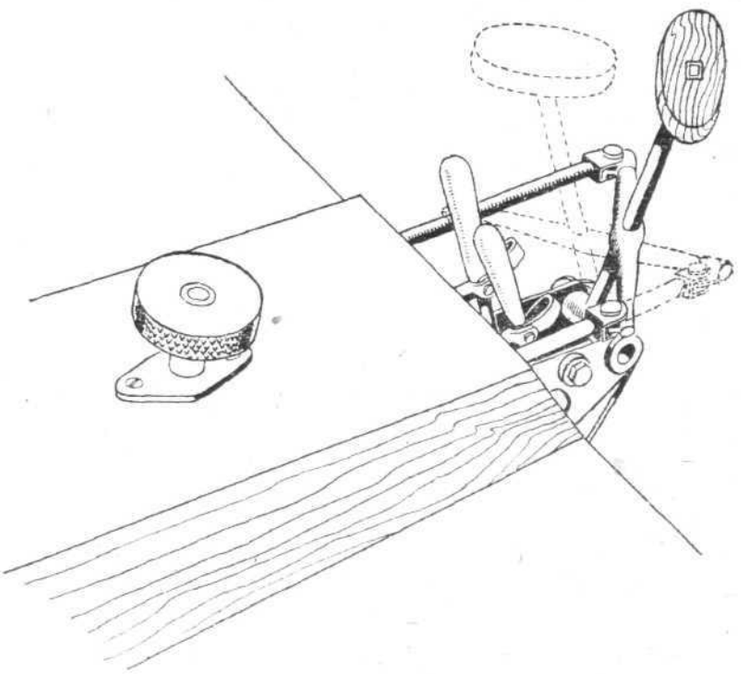
In the detail construction of the wings many unusual features are also found. First of all, the spars are of unorthodox design, being, in fact, in duplicate, each consisting of two



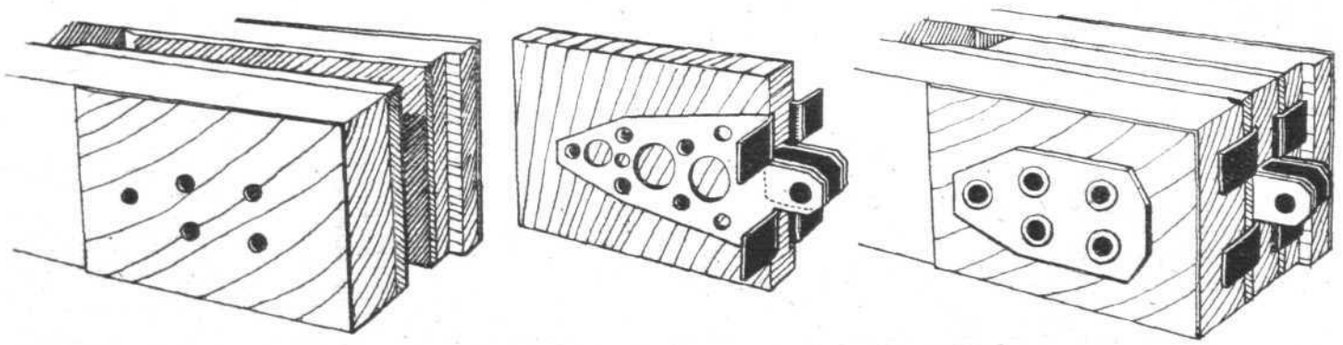
THE NIEUPORT "LONDON": Sketch showing the observer's seat



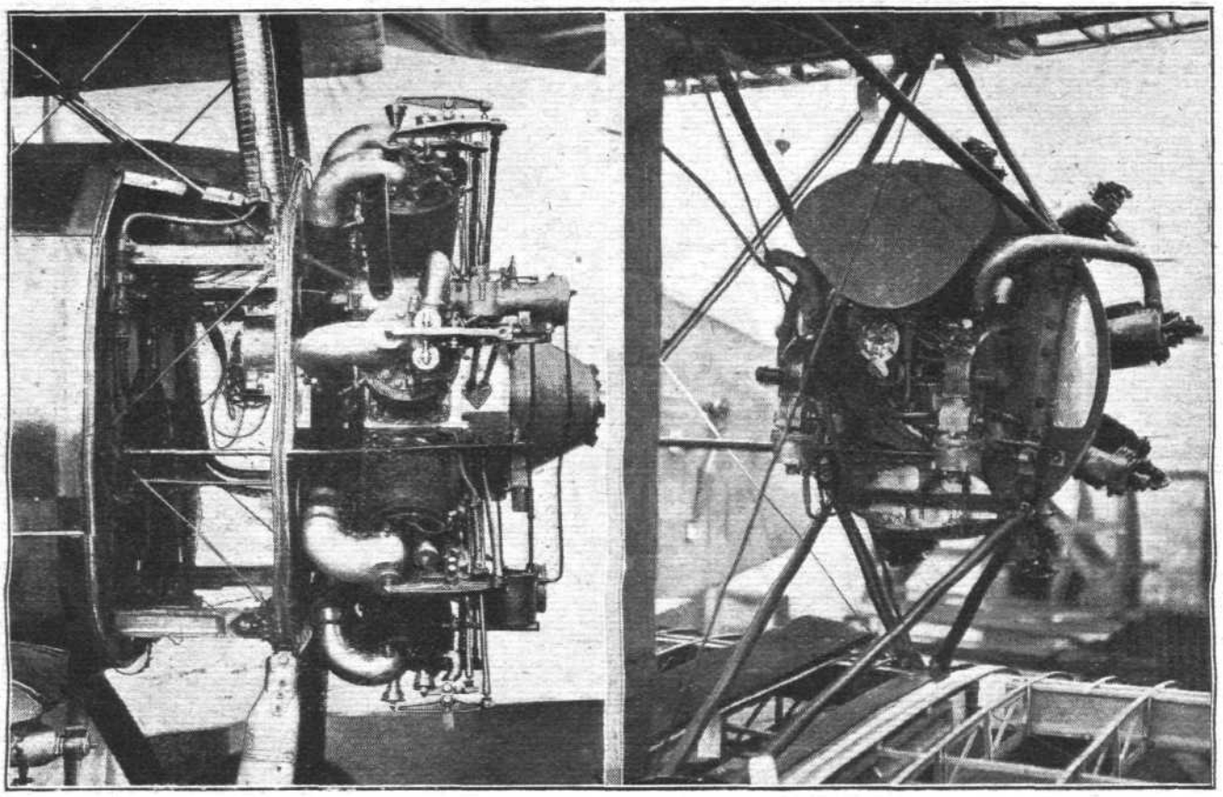
THE NIEUPORT "LONDON": Attachment of interplane strut to one of the double spars



THE NIEUPORT "LONDON": The engine controls



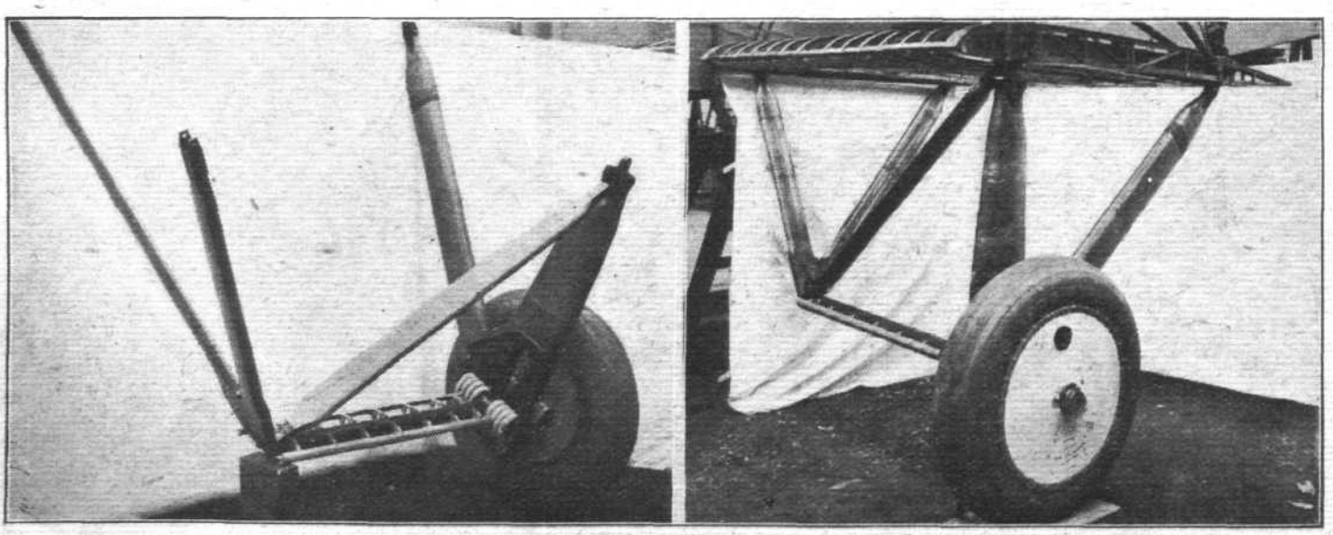
THE NIEUPORT "LONDON": Sketches showing spar fittings at root of lower spar



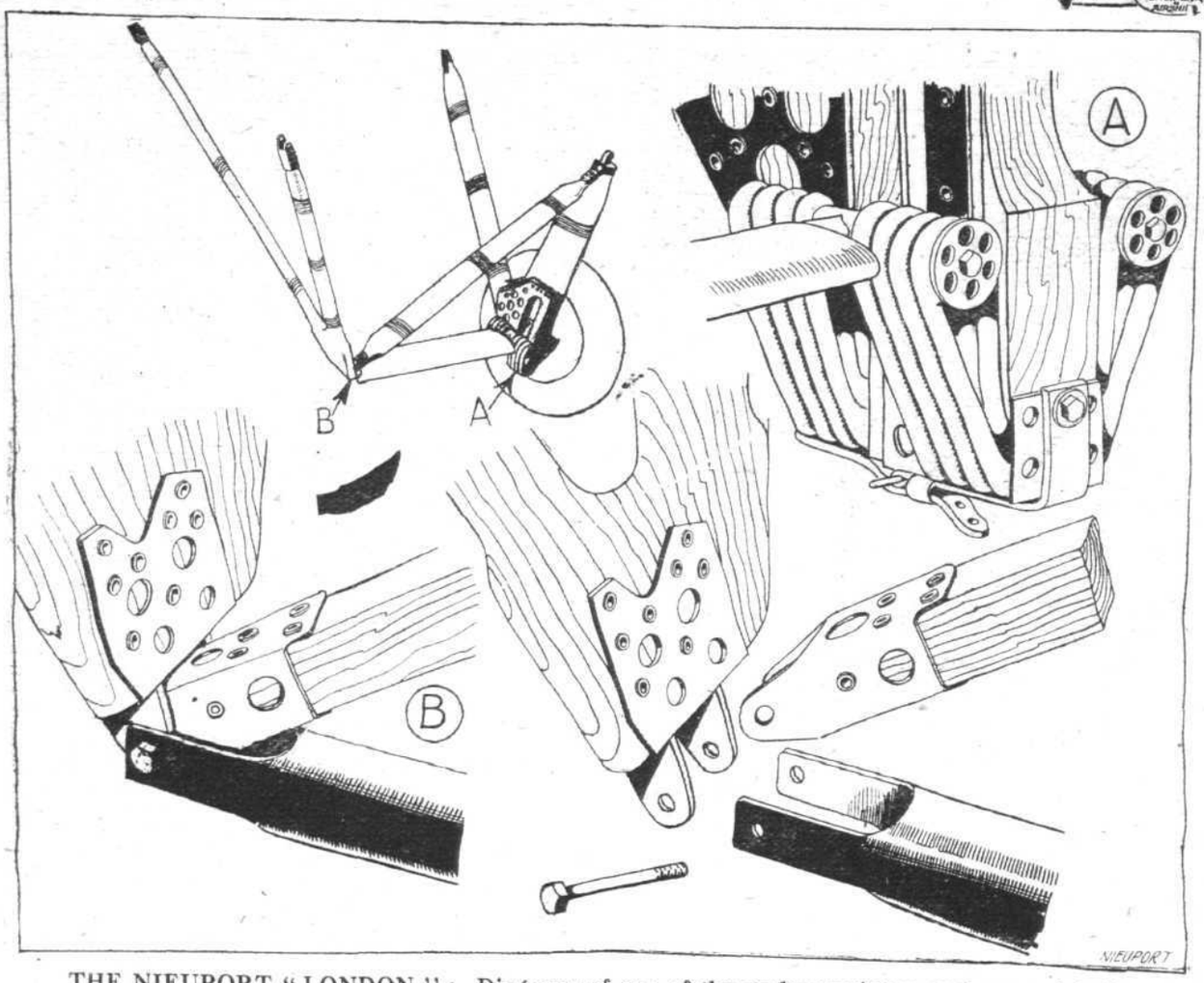
THE NIEUPORT "LONDON": Two views of engine installation

channel sections placed back to back but separated by a gap of about an inch. The material used is spruce, and where fittings occur there is a packing piece between the backs of the two halves of the spar. Several of our sketches indicate this construction, directly or indirectly, and it will be seen that a much greater moment of inertia about the vertical axis of the spar is obtained by this form of construction, which presumably results in a stronger spar, at any rate stronger against drag stresses. From a manufacturing point the construction should be cheaper than the ordinary spar, as thinner planks can be used, and the design has the further advantage that the lift and anti-lift wire fittings can be, and are, housed between the two halves of the spars, thus getting the pulls absolutely central and on the neutral axis. It also enables very simple fittings to be used, and in fact all the wing fittings are of the simplest imaginable form, generally made from sheet steel and entirely without the use of welding. This may sometimes result in a fitting which does not look quite as neat as one whose parts are joined by welding, but personally we know which of the two we would prefer. A *good* welded joint is perfectly satisfactory, but unfortunately one has no indication what is or is not a good welded joint. In any case the work entailed demands skilled labour, whereas the punching out of a fitting from sheet steel and subsequent filing up is a fairly easy operation. Where in the course of making a fitting it becomes necessary to join two pieces of sheet steel this is done, in the Nieuport "London," by riveting and dip-brazing. The accompanying sketches show some of the very substantial metal wing fittings, and are, we think, so clear that an explanation of them is superfluous.

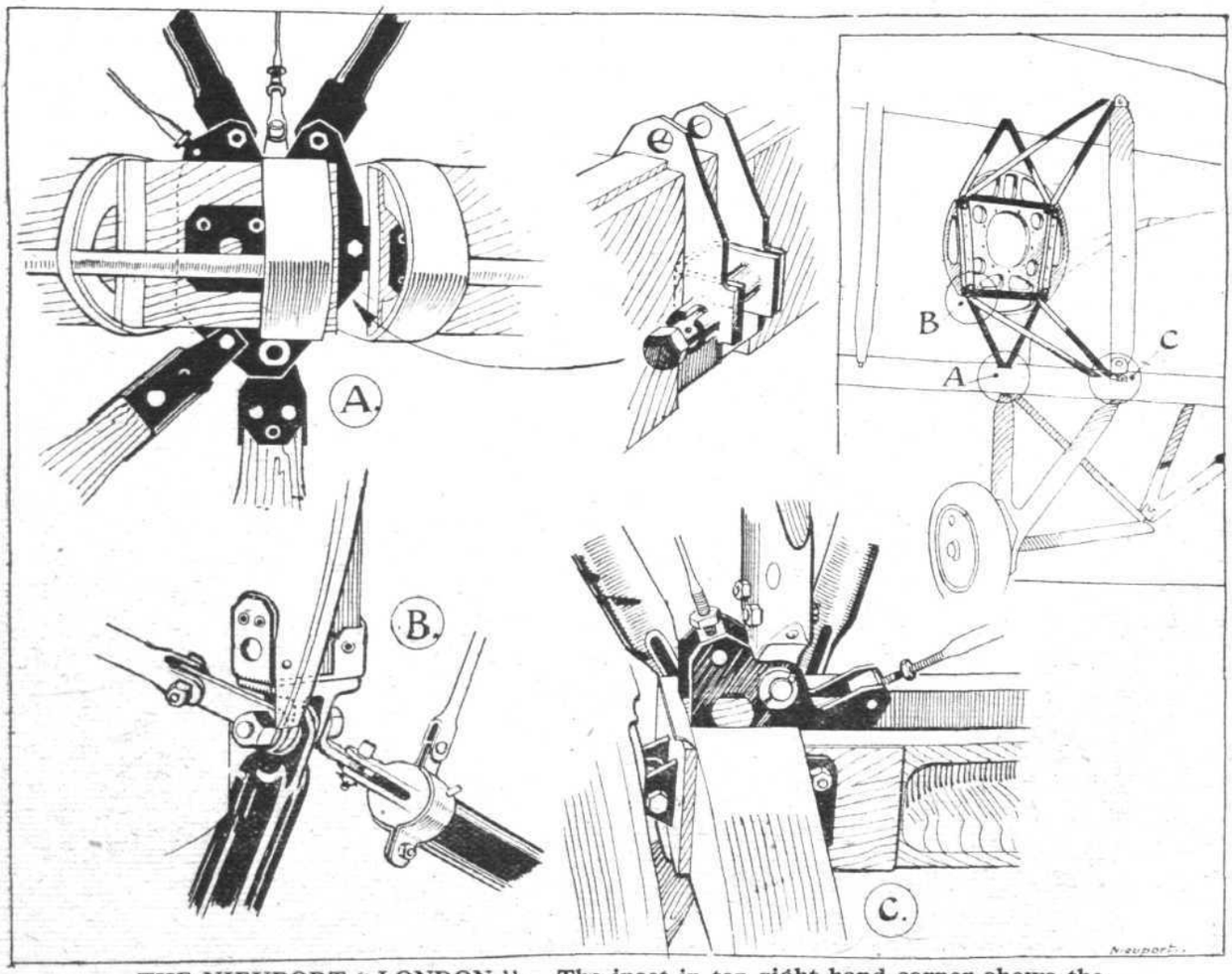
Reference has already been made to the very extensive use made of tubular rivets in the Nieuport "London." Broadly speaking, it may be said that wherever in the ordinary machine bolts and nuts would be employed, tubular rivets are used in the "London." The reason for the adoption of tubular rivets are various, but chief among them is, we believe, cheapness and the fact that they are easily procurable. As a matter of fact, the rivets used in the "London" triplanes were produced by the aid of special tools designed by Mr. Folland, and manufactured at the Nieuport works. We have there seen them being manufactured, and certainly it cannot be denied that their production is both rapid and cheap.



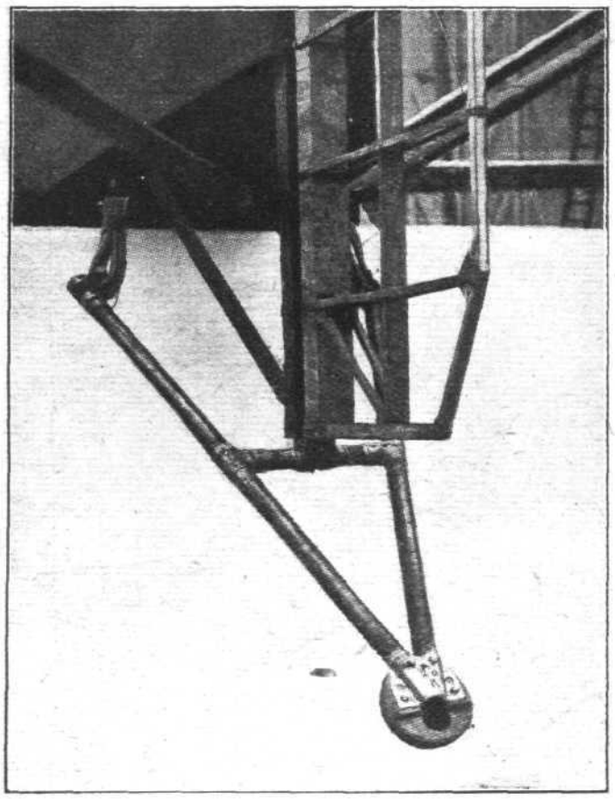
THE NIEUPORT "LONDON": Two views of one of the undercarriages



THE NIEUPORT "LONDON": Diagram of one of the undercarriages and some details.



THE NIEUPORT "LONDON": The inset in top right-hand corner shows the location of details A, B, and C.



The "inverted A" type tail skid of the Nieuport "London."

That, however, is another story, as Kipling would say. For fitting the rivets in place a special tool is required, not unlike the ordinary carpenter's brace in shape, which holds the rivet at the flanged end while turning over the plain end flange. Once in place the rivet looks very neat, there being, of course, no unsightly projections like the nut and bolt head of the ordinary bolt. It would appear that among the more progressive of our aircraft designers the use of tubular rivets is rapidly gaining favour. Thus it may be remembered that in the Boulton and Paul "Bourges" extensive use is also made of this type of rivets.

Owing to the relatively short span resulting from using triplane wings, it has not been necessary to provide for folding the planes. They are, however, built in sections, the centre sections consisting, as regards the lower plane, of short roots attached to the *fuselage* and extending outwards as far as the engine struts. With regard to the middle plane, there is a centre section, carried on four short steel tube struts with wood fairings, which also extends out to the engine struts. Finally the centre section of the top plane is fairly short, and is carried on four outwardly raked struts, as shown in the front elevation of the general arrangement drawings.

Ailerons are fitted to all three planes, and a feature of them is that they are of exactly the same shape and dimensions as the rudder and elevators. The fact that a flap can be used in any of three places reduces the number of spares, which is a considerable advantage, not only for use in the field, but also for a commercial machine.

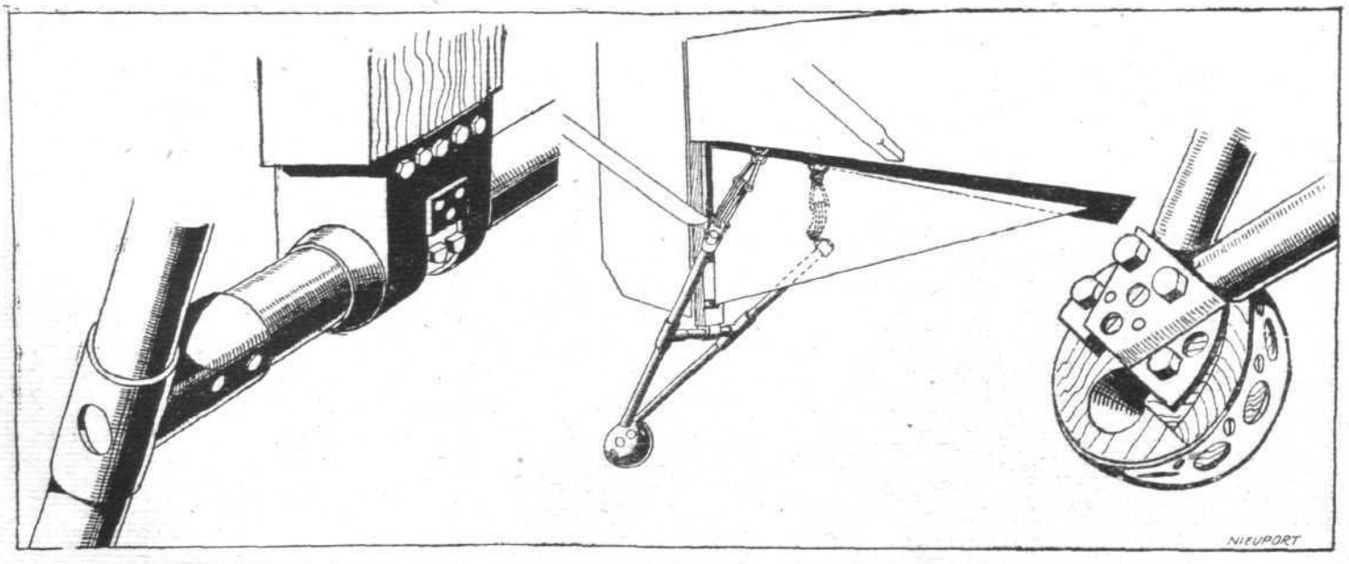
The interplane struts do not call for any special comment, as they are of fairly standard construction. Some of the strut end fittings are shown in our sketches.

Engine Installation

The power plant consists of two 320 h.p. A.B.C. "Dragonfly" engines mounted between the lower and the middle plane. As the accompanying illustrations will show, the engines are enclosed in very neat streamline "power eggs" of aluminium. The main petrol tanks are in the *fuselage*, but each engine has its oil tank mounted behind it inside the streamline casing. As the mounting of the engines is somewhat unusual it will be referred to in some detail. Most of our readers will be familiar with the mounting of the "Dragonfly" engine in the famous Nieuport "Night-hawk," in which a substantial multi-ply wood plate carries the engine. A similar plate is used in the "London," as indicated in the illustrations. So far there is nothing very unusual in the engine mounting. The novel features of the engine supports are found in the manner in which the engine plate is mounted between the lower and middle plane. First of all, the engine plate is reinforced by laminated struts forming a trapezoid. From the lower corners of this trapezoid two steel tube struts run to a point on the lower front spar. From the two upper corners of the trapezoid another pair of struts form an inverted vee with its apex on the front spar of the middle plane. This set of tubes prevents lateral movement of the engine plate. Longitudinally the engine plate is held in position by two other pairs of vee tubes, running to the top and base respectively of the rear inter-plane strut. In addition, the ordinary set of incidence wires, in the plane of the rear strut, complete the bracing of the engine structure. Nothing very much simpler in the way of engine mounting could be conceived, and we understand that in practice this mounting has been found entirely satisfactory. The aluminium casing merely serves to streamline off the engine, and does not take any part of the load stresses. From the general arrangement drawings and photographs of the machine it will be seen that there is no strut above the engine, *i.e.*, no struts between the middle and top planes in line with the engine. The wire bracing, however, crosses the middle front spar at this point.

Petrol System

The petrol system in the "London" is of the simplest type. There are two cylindrical main tanks in the *fuselage*, and a gravity tank is mounted in the middle plane over each engine. Thus each engine has its main and header tank. The capacity of the petrol tanks is 175 gallons, or sufficient for a four hours' flight. As already mentioned, the oil tanks are mounted, one in each *nacelle*, behind the engines.



THE NIEUPORT "LONDON": Some details of the "inverted A" type tail skid.

The Undercarriages

Not only in the *fuselage* and wing construction, but also in the design of the undercarriage of the " London," does one meet with unorthodox design. In the majority of twin-engined machines having two wheels only, these are carried on bent axles, the inner ends of which are hinged to the lower *longerons* of the *fuselage*. In the Nieuport " London " Mr. Folland has adopted a different arrangement, which avoids bending the axle. A laterally hinged vee of spruce struts is placed immediately underneath each engine. This vee carries the rubber shock absorbers and has at its apex a slot in which the axle is housed. The inner, or free, end of the axle is pivoted to the apex of another vee, the legs of which are attached at their upper ends to the lower *longeron* of the *fuselage*. This vee slopes outward from the body, so as to reduce the length of the axle, and the two vees are braced laterally by a diagonal strut, taking tensile as well as compressive loads, according to the stresses imposed upon the undercarriage structure. This briefly, is the principle of the " London " undercarriages, and the details will be plain from an inspection of the accompanying sketches and photographs. While on the subject of the undercarriage, mention should be made of the tail skid. This member is of tubular construction, and has the shape of an inverted A. It is mounted on a crosshead in which the lateral tube pivots, and which is in turn carried on the lower end of a tube working inside the stern post. In this manner, it will be seen, the skid is free to move both laterally and longitudinally. Stops are provided on the cross tube to prevent the free end of the skid from dropping straight downwards. Rubber shock absorbers are incorporated between the two upper ends of the legs of the A and the *fuselage longerons*. At the free end the skid terminates in a hemispherical " spoon " which can be easily renewed in case of wear.

Accommodation and Armament

Three seats are provided in the front portion of the *fuselage*. In the extreme nose is a seat for the gunner, while farther aft, and on a slightly higher level, are two seats side by side. The floor of the main cockpit slopes down on the port side to the front gunner's cockpit, so that it is possible for the gunner to sit normally next to the pilot. If it becomes necessary to defend the machine against an enemy aircraft, the gunner slips through into the front cockpit in which is a Scarff ring with two machine guns. Bomb racks are provided for 9 bombs, so arranged that they are taken on board in sets of threes and can be released either singly or by twos or threes. There is sufficient clearance under the *fuselage* to allow of wheeling the crate of bombs underneath and hoist them into place.

Controls

The controls are of more or less orthodox design, with a wheel for the operation of the *ailerons*, forward and back movement for elevator, and a foot bar for the rudder. Trimming gear is provided for the tail plane, the wheel being mounted on the starboard side of the pilot's cockpit. On the front of the seat support is mounted a wheel which operates the setting of the fin, so that the yawing moment set up by flying on one engine only can be corrected by suitable setting of the fin. It has been found quite possible to fly the machine level on one engine by setting the fin, although there is then, of course, no reserve power for climbing. With both engines running the machine is, we understand, very pleasant to fly and trims well at all speeds within her speed range.

As a Commercial Machine

An examination of the accompanying illustrations will show that with very little modification the " London " could be turned into a very useful passenger or goods machine. The only alteration necessary would be a new *fuselage*, extending upwards as far as the middle plane. Such a body could be arranged to seat about 12 passengers, and we understand that, as a matter of fact a body of this description has actually been designed for the machine by Mr. Folland. In view of the unusual features which make for low first cost and equally low upkeep and running expenses it is very much to be regretted that such a machine was not tried on a commercial air route, since the constructional features would appear to have much to recommend them. Many of these features have been patented, such as the body construction, the chassis strut fittings, the application of tubular rivets, the fin adjustment gear, and the spinner propellers. All these patents were taken out as long ago as 1918. The practical closing down of the Nieuport firm is probably too far progressed to permit of any hope of a resurrection, but one ventures to express the hope that the services of a designer of Mr. Folland's capabilities will not be lost to aviation but that he will find the opportunity of continuing the excellent work he has commenced while with the Nieuport and General Aircraft Co.

Following are the main data of the Nieuport " London " night bomber:—Span 59′ 6″. Length o.a., 37′ 6″ Wing area 1,100 sq. ft. Chord 6′ 8″. Gap 5′ 10″. Wing section R.A.F. 15. Angle of incidence 3°. Dihedral angle 174°. Weight empty 4,380 lbs.; weight fully loaded (with fuel for 400 miles and 2,000 lbs. of bombs) 8,650 lbs. Load/sq. ft. 7.72 lbs. Load/h.p. 13.28 lbs. Speed 95 m.p.h. at 10,000 ft. Endurance 4 hours. Climb 10,000 ft. in 20 mins. Ceiling 18,000 ft.

ROYAL AERONAUTICAL SOCIETY NOTICES

Lectures.—At the meeting on Thursday, December 16, Mr. H. Ricardo will read a paper on " Possible Developments in Aircraft Engines," to be followed by " The Installation of Aeroplane Engines " by Mr. A. J. Roweledge.

Binding Cases for the Journal.—Arrangements have been made for the binding of complete sets of the Journal for 1920 in blue cloth cases with gilt lettering at a charge of 4*s.* 6*d.* per volume, including the supply of the case. Members who desire to take advantage of this arrangement should forward their sets direct to the Lewes Press Ltd., High Street, Lewes, at the same time sending a remittance for 4*s.* 6*d.* to the Secretary at the Society's offices. A note stating the name and address of the sender should be enclosed in the parcel to the binders. The complete volumes will be returned direct to Members postage paid.

List of Members.—A new List of Members, corrected up to October 31, is now available, and copies will be sent to Members on request.

Finance.—The Balance Sheet and Income and Expenditure Account for the six months ending June 30, 1920, have now been adopted by the Council. They show a deficit on the six months' working of £277.

Library.—The following book has been received and placed in the Library of the Society: " History of 99 Squadron, R.A.F." by Sqdr.-Ldr. L. A. Pattinson.

W. LOCKWOOD MARSH, Secretary

Air Work in Mesopotamia

IN the review of the operations in Mesopotamia between October 18 and November 18, issued by the War Office last week, the following appeared :—

" Our aeroplanes have been active in support of these operations [the punitive operations between Hillah and Tuwairij] and have also extended their incursions further to the south against the still hostile tribes of the Shamiyeh division. So effective has been their action that many of these tribes have expressed their desire to surrender, and this defection, if it should in fact come about, will go far in disheartening the remaining recalcitrants and in facilitating our speedy reoccupation of their territory.

An Air Raid on Enzeli

EFFECTIVE results were achieved apparently in a British air raid carried out on the Enzeli jetty on November 19, The storehouses on the quay were destroyed by a heavy bomb, and simultaneously the Bolshevik troops were driven back towards Resht.

Air Work on Afghan Frontier

IN his announcement of the acceptance of the British terms by the Wana Waziris, the Viceroy of India states :—

" As a result of aerial operations on November 15 and 21, the Hassan Zai and Tilli Sayyida tribes of the Black Mountains have handed in the balance of rifles."

French and Naval Aircraft

EXPERIMENTS are being carried out by the French Ministry of Marine, at Toulon, with a view to ascertaining the best method of utilising aeroplanes for naval work. The battleship " Bearn," which was not completed at the time of the Armistice, has been fitted up as an aircraft carrier, and various methods of getting off and alighting on the deck are being tested.

NOTICES TO AIRMEN

(130) Customs Officials in the County of Kent

1. WITH reference to Schedule VIII, paragraph 21 of the Air Navigation Regulations, 1919, dealing with the procedure to be followed in the event of an aircraft arriving from abroad and landing in any place other than an appointed aerodrome, pilots are informed that the Civil Aviation Traffic Officer in charge of Lympne Aerodrome, Hythe, Kent (Telephone number: Hythe 123; Telegraphic Address: Aeronautics, Hythe), will in future maintain a list of all Customs officials serving in the county of Kent, for the information of pilots in charge of aircraft who have been compelled to land outside Customs aerodromes. On application the C.A.T.O., Lympne, will give the name and address of the officer nearest to the place of landing.

2. In all cases where it is necessary to despatch a Customs officer from a Government-controlled civil aerodrome to the scene of a forced landing in order to "clear" aircraft, a charge for the conveyance of such officer will be preferred against the owners of the machine concerned.

(131) Fixed Balloon at White City, London

PILOTS are warned that a fixed balloon may be flown over the International Advertising Exhibition at the White City, London (Lat. 51° 31′ 0″ N., Long. 0° 14′ 0″ W.), from Monday, November 29, 1920, to Saturday, December 4, 1920.

NOTICES TO GROUND ENGINEERS

(14) Beardmore Engines, 120 H.P. and 160 H.P. Water Pipe, Part No. 11358/12.B., connecting the Top Water Rail with the Carburettor Jacket

1. Certain engines of Beardmore 120 h.p. and 160 h.p. types were supplied with the water pipe made of copper tubing, but owing to cases of failure it became necessary to introduce a modification, and the material was changed to steel to Air Board Specification S.26, the lower end of the pipe being connected by a short length of flexible P.R. tubing.

2. It is therefore recommended: (i) That any engines which have not already been modified should be converted as above before installation in civil aircraft. (ii) That in cases of failure of this pipe in any engine not so converted and already installed, this modification be introduced forthwith.

(15) Siddeley "Puma" Engines: Disuse of High-Compression Pistons

1. SIDDELEY "PUMA" engines, manufacturers' numbers from 8199-9982, were fitted with high-compression pistons. As the result of Service experience it was decided to convert these engines to low compression, by replacing pistons, part No. 703/19, with pistons, part No. 703/10a.

2. A considerable number of these engines have already been converted, and can be identified by reference to the Log Book, or to the statement stencilled on the crankcase.

3. Ground engineers operating should ensure that all "Puma" engines in use or intended for use in civil aircraft are converted as above. In all such cases the letters "HC" on the crankcase and the compression ratio figures on the instruction plate should be defaced, and a note inserted in the Log Book.

4. After converting an engine to low compression, a test run of at least 30 minutes' duration should be made, and if lubrication and pistons appear satisfactory on inspection, a short test at full power hould be given.

5. *No aircraft equipped with a Siddeley "Puma" engine fitted with high-compression pistons can be granted a Certificate of Airworthiness.*

Personals

Back from Russia

Included in the party of British officers and men, who arrived in England on November 22, after being imprisoned in Russia, was Capt. W. G. NEVILLE, R.A.F.

Married

Capt. WEDGWOOD BENN, D.S.O., D.F.C., M.P., was married on November 17, at St. Margaret's, Westminster, to MARGARET, daughter of Mr. D. T. HOLMES, formerly M.P. for Govan, and a granddaughter of Provost Eadie, of Paisley.

REGINALD WILLIAM GODFREY, Indian Police, late R.F.C., son of Mr. and Mrs. J. W. Godfrey, of Barkingside, was married on November 15, at the Parish Church, Hayes, Kent, to AUDREY SHEILA, daughter of Mr. and Mrs. CROSLAND MALLAM, of Heathfield, Keston, Kent.

Lieut. WALTER FREDERICK KNIGHT, R.A.F., second son of F. E. Knight, Esq., of Purley, was married on November 20 at the Church of St. Vincent de Paul, Altenburg Gardens, to CONSTANCE MARY, second daughter of F. T. ATKINS, Esq., of 123, Lavender Hill, S.W.

To be Married

An engagement is announced between CHRISTOPHER BENJAMIN HENRY LEFROY, late R.F.C., eldest son of C. B. L. Lefroy, of Vernon, British Columbia, Canada, and nephew of the Provost of Queen's College, Oxford, and ANGELA, daughter of Mr. and Mrs. E. F. ELTON, of Burleigh Court, Gloucestershire, and late of Wellington College, Berkshire.

The engagement is announced between JOHN R. POTTER (late Major, R.A.F.), elder son of Canon and Mrs. Hasloch Potter, of Surbiton, and JESSICA THOMAS, widow of Owen R. Thomas, and only daughter of Mr. and Mrs. Wilson Cruttwell, of 5, Oak Hill Road, Surbiton.

The engagement is announced between ALLAN TILBROOK REID, late of the R.A.F., third son of the late Mr. and Mrs. Robert Reid, of Campanha, Oporto, and AUDREY NOËLE, only daughter of Mr. and Mrs. HERBERT W. PHEYSEY, of Oporto.

Item

Mr. ARTHUR BRIGGS, of The Manor, Bingley, Yorks, formerly of Tyringham, Duchy Road, Harrogate, worsted spinner and manufacturer, of Messrs. Briggs, Pollit and Co., Ltd., a director of Rolls-Royce, Ltd., who died on March 31, aged 56, left estate of the gross value of £243,203, with net personalty £212,616.

Army Casualties in Ireland

IN the list of officers and other ranks who were victims of murder or attempted murder in Ireland during October, issued by the War Office on November 25, appeared the following:—

Officer Killed.—Flight-Lieut. G. A. Richardson, Royal Air Force.

The Zeppelin for Italy

THE Zeppelin "L.120" on November 19 left her station at Seerappen, Koenigsberg, for Stolpe in Pomerania, where she will be handed over to representatives of Italy, to which country she has been assigned. The hangar at Seerappen has also been assigned to Italy; it is to be taken down, transported to Milan, and re-erected there to house the "L.120," which claims to have made a duration record of 105 hours.

An Aerial Derby in Australia

THE first Aerial Derby to be held in Australia took place on November 27 over a triangular course starting from the Mascot aerodrome at Sydney, going to Camden, thence to Richmond and back to Sydney. The winner was Capt. Matthews on a Sopwith G.N.U., who covered the 64 miles in 42 mins. 54 secs., while Lieut. Love, on an Avro, won the handicap.

Triple Fatality in New Zealand

AFTER making many flights in New Zealand and carrying hundreds of passengers, Capt. Richard Russell, D.F.C., Croix de Guerre, met with an accident at New Plymouth, N.Z., on November 12. He and his two passengers, Mr. James Clark, Mayor of New Plymouth, and Miss Kathleen Warnock, were killed.

THE MILLER-METCALF AMPHYGLIDER.

An Air-Propeller-Driven Light Car, Readily Adapted to Aquatic Use

ONE of the most interesting specifications filed with our Patent Office for some time past is that covering the design here diagrammatically illustrated.

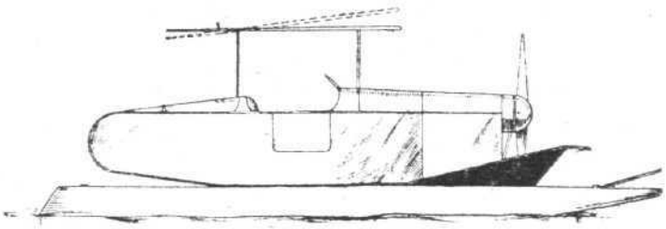
The machine comprises a three-cylindered air-cooled radial motor, driving an aeroplane-type propeller. The body and frame are a single construction, suspended upon four quarter-elliptic springs, detachable at their frame ends, so that the body, or *fuselage*, can be dropped on to floats and turned into a hydroplane. Alternatively, floats can be fitted under the running-boards and to the axles, so that the machine can be driven on land and into the water, at will, without the driver having to leave his seat.

As will be seen, the propeller is guarded by the fore axle and the cross-member between the wings. So that there should be no inconvenience from dust lifted by the propeller, a funnel-casing runs beneath the machine, the fore-end of which is a kind of scoop-cowl, inside which the propeller's lowest points revolve, the air being so driven through the funnel that this part of the slip-stream leaves the machine at its rear end in an upward direction. The canopy shown in the "marine" presentment is for use either ashore or afloat. When tilted as shown by the dotted line, it acts as a plane, reducing the weight on the wheels, or floats, as the case may be.

A forward, a reverse and a free gear are provided, so that the propeller need not be revolving while the machine is stationary, even if the engine be kept at work. The reverse gear can be used as an air-brake when descending steep hills, but brake-drums are also fitted on the hubs of the rear wheels, a pedal and a lever being employed to apply expanding shoes with varying degrees of severity. While the machine is travelling the slip-stream from the propeller is not sufficient to inconvenience other road-users; and while the engine is being started it is necessary to stand immediately at the rear of the machine to feel the full force of the current of air. People standing at the side of the machine are not affected.

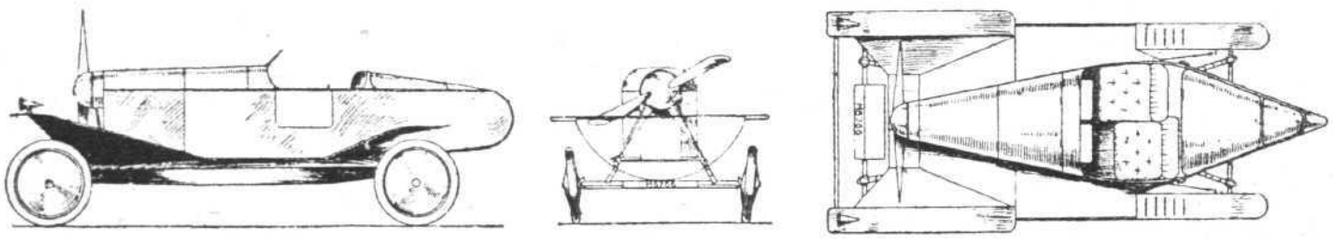
On the point of power, the inventor states that his machine, in touring trim, is capable of a speed of 70 m.p.h. on the level, and will climb a gradient of 1 in 3·5 without "rushing" the hill. At a road-speed of 25 m.p.h., the propeller is revolving at only 500 r.p.m., approximately. With the wheels in position, the speed on water is not very high; but used as a hydroplane, with the wheels and axles detached, the speed is said to be about 30 knots.

With the exception of the brake-gear, there is no mechanism aft of the bonnet, and the weight is less than half that of an equally-powerful car. The wheels do only "rolling" duty, a fact which minimises tyre-wear, and is said also to give much easier riding than can be obtained by a car two of whose wheels are actually propelling the vehicle. All four wheels of the Amphyglider "trail," obviously.



THE MILLER-METCALF "AMPHYGLIDER": In this view the machine is shown mounted upon a hydroplane hull, but it can also be used merely with floats attached to running-boards and axles.

With an overall length of 13 ft. 4 ins., an overall width of 5 ft. 10 ins., a wheel-base of 9 ft. 6 ins., and a track of 4 ft. 6 ins., the inventor claims that this machine can be manufactured (with the floats used to convert it into a water-car) at about one-half the cost of a car of equal power, adding that the upkeep-cost will be considerably lower than that of a similarly serviceable car. It must be clear that the foregoing particulars have been supplied by Mr. Miller-Metcalf, as also the illustrations; but we shall be pleased to furnish his address to anybody interested, either academically or commercially, in his design.



THE MILLER-METCALF "AMPHYGLIDER": Elevation and plan views of the machine, displaying mainly the moderate dimensions of the propeller, the completeness of its protection, and the splayed quarter-elliptic suspension employed. In the centre is a fore-end elevation.

Aircraft Production in Germany

IT is stated from Berlin that Air-Commodore Masterman, the president of the Inter-Allied Aeronautical Commission in Berlin, notified the German Government on November 16 that the Ambassadors' Conference decided on November 3 to consider the Spa protocol of July 12 as annulled, and the Boulogne decision of July 27 as being still in force. It may be recalled that the Boulogne decision prohibits the manufacture and importation of aeronautical material until three months after Article 202 of the Peace Treaty has been carried out.

Article 202 of the Peace Treaty provides that, on the coming into force of the Treaty, all German military and naval aeronautical material, except the machines mentioned in the second and third paragraphs of Article 198, must be delivered to the Governments of the principal Allied and Associated Powers. Delivery must be effected at such places as the said Governments may select, and must be completed within three months.

A Competition for Norway

AN international competition for aeroplanes, the first to be held in Norway, is being organised to take place during the Northern Sports week, in February next. It is anticipated that there will be some entries from Finland, while some new ideas in the way of chassis specially designed for landing on snow and ice should make their appearance.

The Holland-Java Flight Off

IT is announced from Amsterdam that the proposed flight of an escadrille of flying boats from Holland to Java will not be proceeded with, at any rate for the present. Lieut. Koppen, who was to have led the adventure, is now busy arranging for a flight across Europe.

Holland to Encourage Civil Aviation

WITH a view to speeding-up the development of civil aviation in Holland, the Royal Aero Club of Holland has appointed a Committee for Aerial Touring. Among the istem which are put down for its consideration are: Modifications of the International Aeronautic Convention to facilitate aerial touring; study of the best machines for touring; competitions; development of aerial routes; research work on signals, etc.; simplification of customs formalities; means for popularising aerial touring.

DURING the procession in Dublin last week of the bodies of the murdered officers, over the line of route from George the Fifth Hospital, near the Phœnix Park, and along the four miles of quays to the North Wall, on their way to England, aeroplanes travelled slowly. The drone of the engines above, heard in the hushed silence of the onlookers, sounded as a fitting funeral dirge for so sad a passing.

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Two R.A.F. squadrons formed this escort. Each squadron comprised six large machines, which were divided into two sections of three, each of which flew up and down the route in triangular formation at the lowest possible speed consistent with the maintenance of position.

They commenced their operations shortly before the time announced for the start of the long and solemn cortege, and maintained their guard until a little after the coffins had been placed on board the destroyer at the North Wall.

The distance between each machine was admirably maintained all through the long flight, and the "dipping" as a mark of respect each time the coffins were passed over was done with considerable effectiveness.

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FOLLOWING no doubt precedent in the playing of light music by military bands upon returning from a funeral, the formation of the aerial escort was broken up after the embarkation, and, according to a reporter, the pilots "indulged in many playful and sometimes thrilling stunts on the way back to the aerodrome."

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INCREASED International postage rates, following the Universal Postal Congress, which this year has taken place at Madrid, are a matter of course in the near future. One thing the delegates have left an open question is air company service. Full liberty has been reserved for administrations running air lines to stipulate their own rate for the present. This may be amended when the next Postal Congress takes place at Stockholm in 1924.

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Apropos Mr. Melville's article upon Air-post stamps, to which reference was made last week, he gives an interesting story relating to an "error"—those opportunities for collectors with long pockets to corner all other collectors' collections. The Air-post error instance he quotes is that of the bi-coloured 24-cents United States stamp with the picture of the biplane in the centre inverted. This "looping-the-loop" error, Mr. Melville states, was due to the placing of one sheet of 100 stamps in the press upside down for the second impression. The sheet thus printed in error escaped detection until it was bought over the counter at the Washington post office. It was subsequently acquired by Colonel E. H R. Green, the son of the celebrated Mrs. Hetty Green, for $20,000. He sold fifty-seven out of the 100, and then had the misfortune to lose the balance of forty-three, which he had kept for his private collection, in the wreck of his steam yacht *United States* on the rocks near New London, Connecticut, in August, 1919. Thus, although 100 of these errors were printed, only fifty-seven remain available to collectors today, the balance having been destroyed.

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ADMIRAL SIR PERCY SCOTT, at a gathering last week of the Worshipful Company of Glaziers, made a bid for reviving the fatal policy of a dual Air Service. Speaking of the lessons of the War in regard to submarine *versus* battleships, in which he claimed, amongst other incidents, that the latter (which were not sent to the bottom) had, in the Mediterranean, upon the appearance of a German submarine, to hurry into harbour and lash merchantships alongside to protect them against torpedoes. "This looks," he continued, "very much as if the old naval standard had gone. What is the new one to be? The only decision come to during the War was to take away from the Navy its most vital arm both of attack and defence, the Air Service; this in my opinion was a terrible blunder. The only object of a battleship is to carry a certain amount of high explosives from this country into someone else's ship; or someone else's country; she can only carry a limited amount, she travels very slowly, is vulnerable to submarines, and also to bombs and torpedoes from the air. To spend seven million pounds on a transporter of a limited amount of high explosives, and in addition to pay in peace time £120,000 a year on her upkeep, does not appear to me to be a policy of economy."

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ALL of which looks like good sound commonsense, except the peevish misleading way Sir Percy refers to the bringing into being of the R.A.F. It seems a pity to spoil a good case by such tactics.

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WHATEVER is being done—or left undone—here, the Chinese seem to have awakened fairly well to the huge possibilities of aviation in their tiny terrestial holding. By way of a trial start an air mail service between Pekin and Tientsin was put into operation last June, and now this has been improved upon by the Chinese Cabinet authorising the linking up by air of the capital with Shanghai—a distance of about 700 miles. There are to be three intermediate stations and 80 landing grounds. It is hoped that after carrying the mails for six months, a public service will have been secured which will carry both passenger and goods traffic.

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FURTHER, in this connection, at Birmingham this week an opportunity has been afforded of inspecting two light-houses built by Messrs. Chance Bros. and Co., Ltd., Smethwick. They have been made for the Chinese Imperial Maritime Customs, and one is destined for Dodd Island and the other for the Shantung promontory. The former light is to be placed 147 ft. above sea level, and will be visible from a vessel's deck at a distance of 22 miles, the intensity of the beam being 331,000 candle power. The second light will be placed 220 ft. above sea level, and will have a visibility of 25 miles.

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THESE are sister-installations to night-flying aircraft guide beacons which the development of night-flying is bringing into prominence, under the enterprise of Messrs. Chance Bros. One apparatus which was seen at the same time as the above light-houses has acetylene burners giving a 500 candle-power beam, visible at a distance of nine or ten miles from an altitude of 10,000 ft. Another is a revolving light, a cluster of acetylene burners giving a maximum intensity of 2,645 candle-power, visible for 19 to 20 miles from the same altitude.

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ANOTHER feather in the cap of the Hun is clipped in by Mr. Eastman, who at a conference last week of the Central Association for the Care of the Mentally Deficient and the National Special Schools' Union, at Church House, Westminster, stated the fact that in certain East Yorkshire coast towns several children born in the time of the air-raids were showing signs of mental deficiency.

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ALTHOUGH during a discussion last week by the Cornwall Sea Fisheries Committee the project of employing aircraft for helping fishermen to locate shoals of fish was described as "bunkum," it was decided upon the motion of Col. Cornish to petition the Air Ministry to give a helping hand. The expense, it was considered, would be too great to be borne by the Cornwall fishing industry.

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DURING the unveiling by Sir William Robertson on Armistice Day of the Potteries' Cenotaph at Stoke-on-Trent, it is alleged that Capt. O. P. Jones flew over the monument and dropped a wreath. This opened up a question of a breach of the provisions of the Aviation Act, 1919, which took the form of a summons in the hands of Police Inspector Adlem of Stafford for said alleged breach. The latter, evidently a sportsman of the right calibre, upon being invited to have a flip when he arrived at the aerodrome to serve the summons, promptly accepted, and paid his footing by endorsing the summons "Served personally in mid-air, November 24, 1920." Whether the Inspector quite expected such full value as a few "loops" thrown in is a question.

FLIGHT

AVIATION IN PARLIAMENT

Coal Aston Aerodrome

MR. HOLMES, in the House of Commons on November 19, asked the Minister of Health whether his attention has been called to the unused buildings at the Coal Aston Aerodrome, near Sheffield; and whether, in view of the present shortage of houses in the district, some habitable use can be made of them?

Dr. Addison: I understand that the buildings in question are still being used by the Air Ministry, but that they will be available for disposal at an early date, and I am making enquiries as to the possibility of using them for housing purposes.

Mail Contracts and Aviation

IN the Commons on November 23, when the Postmaster-General (Mr. Illingworth) asked for the approval of the House to the contract, dated November 11, 1920, between the Postmaster-General and the London and North-Western Railway Co. for the conveyance of His Majesty's mails between Holyhead and Kingstown, from November 28, 1920, the question of aerial mails was discussed.

Mr. Lindsay, referring to the period of the contract, said he could quite realise that the London and North-Western Railway Co. could hardly be expected to provide ships for a shorter period, but it appeared to him that, considering the advances that had been made during the last six or seven years, the mails to Ireland would probably be taken by air before twenty years had passed, and then this contract would have to be lapsed, or the service would have to run at a loss, because there was a clause providing that if the mails were diverted to other routes the contractors would have to submit to arbitration as to what abatement should be made in the subsidy.

Lieut.-Comdr. Kenworthy: The vessels are of an extraordinarily useful type in war time. They were very useful in the last War, and made very handy transport steamers. But that ought not to blind us to the fact that there is a great future for air transport of mails, and this route is ideal for that purpose, and without a doubt in quite a few years—I think within five years—the commercially most efficient method of carrying the mails, as regards speed and so on, will be by air. I want to ask the Postmaster-General whether any commercial air companies were invited to tender for the carriage of mails by air either now or in the near future. I am very much afraid the Post Office is not nearly so alive to the importance and practicability of carrying mails by air as other countries are and as they ought to be. The number of mails flown with letters by the mail-carrying aeroplanes in the United States is very great indeed. It is a regular thing between many of the inland towns, and I am afraid our Post Office is lagging behind in this matter and is not putting forward its best efforts in research in this matter as we have a right to expect. This contract provides a subsidy of £100,000 a year for 20 years for carrying the mails between these two Governments, and that subsidy would be of extraordinary value to an aircraft company or group of companies who could form a syndicate for the purpose. A subsidy which is a moderate one for shipping is a very great subsidy for aircraft, because, for the distance covered and the time, aircraft are infinitely cheaper than water-borne traffic. The advantage commercially in favour of aircraft, either lighter or heavier than air, is getting greater and greater almost hourly as progress is made. It is a tremendous mistake if we have in any way bound ourselves in this contract to carry the mails by water for 20 years. I know in Clause 7, there is a rather complicated paragraph which says the Postmaster-General if he shall deem it expedient in the public interest that any new arrangement shall come into force whereby the quantity of mails or number of officers for the time being required to be conveyed shall be substantially decreased, the contract may be modified and, I believe, even cancelled. There are provisions in Clause 28 for arbitration. Have the legal or business advisers of the Post Office been consulted as to whether an advantageous offer by an aeroplane or seaplane company could be considered in the public interest as a reason for annulling the contract and diverting part of the subsidy to air-borne mails? The Government is giving wholly insufficient encouragement to the commercial development of aviation. The Minister for Air has also the Portfolio as Minister for War, and I feel he is too much engaged in aggressive activities to pay attention to the development of air matters, which I regret profoundly. Has the Post Office considered the possibility of the carriage of mails by air? And the same thing applies to passengers and perishable goods. The big lighter-than-air craft have a lifting capacity of fifty tons, and big aeroplanes lift ten tons. In a few years' time, if we are still bound for 20 years to carry these mails by the Holyhead sea route, we will be the laughing-stock of the world.

Lieut.-Col. Moore-Brabazon: This is not so simple a matter as might at first sight appear. In aviation I always think that we are falling into the mistake of presuming too much and giving too little, and that people will be discouraged with the whole subject unless we put the facts more fully before them. The whole question of air mails is a difficult one, because the aeroplane is not an efficient traveller at night, whereas the ordinary traffic across the sea goes on in the dark, and until we educate people to post their letters in the morning, which we shall never be able to do, then this evening service is as satisfactory a thing as one can get. In the London and Paris air service there is very little advantage. The needs of the community are met by the ordinary traffic. But, provided you do get a night service as well as a day service, there is no doubt that an air service can be useful in getting together letters from main sources and sending them on at once and avoiding a great deal of waste of time. The whole question of air mails is one which concerns the general policy of the Postmaster-General. Are you to look upon the carriage of mails as purely a business proposition, or can you use the money voted for the Post Office indirectly to benefit the nation in other ways? We have been told recently by the military authorities, the chief of the Air Staff especially, that an efficient air force must necessarily depend on efficient commercial aviation. Therefore it is to the national advantage to see that somehow commercial aviation in this country should flourish. At present nothing is being done to encourage it. Though there have been recommendations by advisory committees that there should be subsidies, these have not materialised, and in the present state of our finances I do not think they ever will. So commercial aviation looks to the Post Office as one of the few helps that it is ever likely to get.

With regard to Ireland, I do think that a special appeal ought to be made to the Postmaster-General to do his best to try a service as soon as possible, because the difficulties between the two countries, which are largely centred on ethnological and other causes, owe a great part of their existence to the Irish Sea. If we could do away with that, there would be no Irish problem. The better we know each other the less likely we are to quarrel. By increasing the speed of communications we draw the two countries nearer together.

I notice in this contract that Clause 7 allows the Postmaster-General practically to do what he likes with regard to breaking or changing the mode of transport. It is a most extraordinary clause, and seems to me to redound to the credit of the Postmaster-General. I think we ought to have a word from the Postmaster-General that, if possible, he will divert some of the mails along the new route.

Mr. Illingworth: Lieut.-Comdr. Kenworthy referred to the question of air mails. I can assure him that this is not being overlooked by the Post Office. Air mails are at present more or less experimental. There are now air mails to Paris, Amsterdam, and Brussels, but the atmosphere is more favourable for them. There is less cloud and fog than on the route from this country to Ireland. In the United States of America, too, they are able to work under more favourable conditions. These distances over land are very much greater than is possible in this part of Europe, and in the case of landings they run much less danger.

Not only that, but I would remind the hon. and gallant member that the essence of the Irish mail is that it should go by night. At present, of course, night flying cannot be done. I know it was done during the War under exceptional circumstances, but it cannot be expected to be done now, and in fact it is impossible to be done at the present moment. I have had considerable discussions with those interested in the flying industry, and they admit that, as far as that is concerned—the most important point for the mail service—it is impracticable for the moment, and many of them are also of the opinion that they must depend more on the carriage of goods than on the carriage of mails. Clause 7 has been referred to by various hon. members. In case in the next 20 years the mail service by air becomes a practical proposition, there is provision made in this Clause for making a corresponding reduction in the amount paid to the London and North-Western Railway Co. for the fewer mails they carry.

The R.A.F. and the Navy and Army

MAJOR GLYN, on November 24, asked the Prime Minister whether any representations have been made by the Board of Admiralty and by the Army Council that, on account of the vital importance of highly-trained and experienced airmen co-operating with the artillery of the Fleet and the Army, it is advisable to return to a system whereby there is belonging exclusively to the naval and military forces a section of airmen with adequate machines, stores, etc.?

Mr. Bonar Law: The answer is in the negative. The Admiralty view on this point was clearly expressed in the Notes on Naval Policy circulated with the last Navy Estimates, and I understand that the same view is taken by the Army Council.

Imperial Aerial Service

MAJOR GLYN asked the Prime Minister whether there is a distinct separate future for the air service, apart from its co-operation with either sea or land forces; whether the expense and duplication of work of the Royal A.F Force as at present constituted has been justified by results; and whether the Committee of Imperial Defence has yet had an opportunity of considering the whole future of imperial aerial service and co-operation?

Mr. Bonar Law: The answer to the first part of the question is in the affirmative; to the second part that the present arrangements have been justified by results, and to the last part, in the negative.

R.A.F. in Mesopotamia

MR. GALBRAITH, on November 23, asked the Secretary of State for Air what is the present monthly rate of expenditure on the Air Force in Mesopotamia?

Mr. Churchill: The present monthly rate of expenditure on the Air Force in Mesopotamia is approximately £82,000.

In Constantinople

MR. KILEY asked the Secretary of State for Air what is the present monthly rate of expenditure on the Air Force in Constantinople?

Mr. Churchill: The present monthly rate of expenditure on the Air Force in Constantinople is approximately £4,000.

Lieut.-Comdr. Kenworthy: Is there any hope of reducing this Air Force expenditure at Constantinople?

Mr. Churchill: I am entirely in the hands of the Great Powers in the matter. We have a certain force there which must be provided with its quota of aviation.

In Egypt

SIR THOMAS BRAMSDON asked the Secretary of State for Air what is the present monthly rate of expenditure on the Royal Air Force in Egypt?

Mr. Churchill: The present monthly rate of expenditure on the Air Force in Egypt is approximately £80,500.

And in Palestine

MR. TREVELYAN THOMSON asked the Secretary of State for Air what is the present monthly rate of expenditure on the Air Force in Palestine?

Mr. Churchill: The present monthly rate of expenditure on the Air Force in Palestine is approximately £18,250.

R.A.F. Establishment

MAJOR GLYN on November 26 asked the Secretary of State for Air what was the ration strength of the Royal Air Force officers and other ranks on October 1 last, and what was the authorised establishment: whether officers of the Army are to be attached to the Royal Air Force, and for what period; and whether it is intended that a suitable reserve for the Royal Air Force shall be trained, and from what source is it expected this *personnel* will be drawn?

Mr. Churchill submits the following particulars:—

1. The total strength of the R.A.F. on October 1, 1920, was as follows:—Officers, 2,812; other ranks, 23,862.

2. Numbers authorised in Air estimates for the year 1920 to 1921 were as follows:—Officers, 3,059; other ranks, 26,519.

These figures include provision or personnel whose demobilisation had not been effected at the commencement of the financial year.

3. A scheme has been agreed between the Air Council and the Army Council whereby officers will be seconded from one service to the other. A certain number of Army officers have already been seconded to the R.A.F.

4. Junior Army officers will be seconded for four years, but senior officers will be attached for short periods only.

5. It is proposed to form a Reserve for the R.A.F., and detailed regulations concerning training are already well advanced.

6. The Reserve will be drawn from the following sources:—

(*a*) Officers holding short service commissions who have completed their period of service on the active list, and permanent officers of the R.A.F. who may be permitted to retire or relinquish their commissions before reaching the compulsory retirement age of their rank.

(*b*) Officers who, by the conditions of their entry into the R.N.A.S. or R.F.C., have a period of service in the Reserve to complete, and who may be allowed to complete such service in the R.A.F. Reserve.

(*c*) A limited number of flying officers who have returned to civil life after service during the War.

(*d*) Medical officers.

(*e*) Other ranks who have completed their engagement with the regular Royal Air Force.

Aeroplane, Croke Park, Dublin

MR. ALLEN PARKINSON asked the Chief Secretary for Ireland whether the aeroplane which circled over Croke Park on Sunday carried any armament; and whether there was any firing from the aeroplane on Sunday?

Mr. Churchill: I have been asked to reply to this question. The aeroplane carried her normal fixed equipment of one gun. No firing took place from the aeroplane. I may add that the machine was on patrol duty unconnected with the gathering at Croke Park, and her gun was on this occasion partially dismantled.

THE ROYAL AIR FORCE

London Gazette, November 23

Flying Branch

Pilot Offrs. to be Flying Offrs.—S. G. Hollingsworth; Sept. 19, 1919 (since demobilised). F. E. Horley; Oct. 23, 1919 (since demobilised). Lieut. N. McN. Beaton relinquishes his temp. R.A.F. commn. on appointment to T.F., and is granted rank of Capt. The follg. Lieuts. relinquish their temp. R.A.F. commns. on appointment to T.F., and are permitted to retain their rank.—B. E. Gurney; E. R. Watts. Sec. Lieut. (Hon. Lieut.) A. C. Cooke relinquishes his temp. R.A.F. commn. on appointment to T.F. Reserve, and is permitted to retain rank of Lieut.

Transferred to Unemployed List.—Lieut. J. R. Noble; July 26, 1919 (substituted for *Gazette* Aug. 12, 1919). Sec. Lieut. J. P. Armitage; Oct. 1. Lieut. J. R. Pairman; Nov. 12.

Administrative Branch

Sqdn. Leader G. Blatherwick is restd. to active list; Nov. 19. Pilot Offr. J. H. Amers to be Flying Offr; July 22.

Transferred to Unemployed List.—Sec. Lieut. H. E. Hinchliffe; Oct. 22, 1919. Lieut. E. G. Wood; Nov. 13.

Technical Branch

Pilot Offr. M. J. Golightley to be Flying Offr., Grade (A.); Oct. 1, 1919 (since demobilised).

Transferred to Unemployed List.—Maj. D. H. Kennedy, O.B.E.; Aug. 1, 1919 (substituted for notification in *Gazette* April 9). Sec. Lieut. (Hon. Lieut.) V. E. W. Greaves; July 1.

Dental Branch

D. Campbell is granted a temp. commn. as Lieut.; Sept. 11, 1918 (substituted for *Gazette* Sept. 13, 1918).

Memoranda

Seven Cadets are granted hon. commns. as Sec. Lieuts. with effect from date of their demobilisation.

London Gazette, November 26

Short Service Commissions

Flying Officer K. D. Marshall relinquishes his short service commn. on account of ill-health caused by wounds contracted in the Service, and is permitted to retain the rank of Lieut. (Nov. 27). Flying Officer A. E. de Montaigne Jarvis, D.F.C., resigns his short service commn., and is permitted to retain the rank of Lieut. (Nov. 27).

Flying Branch

Lieut. H. W. Humphreys relinquishes his temp. R.A.F. commn. on appointment to the T.F., and is permitted to retain his rank. Lieut. A. H. Harris relinquishes his temp. R.A.F. commn., and is permitted to retain his rank. Sec. Lieut. G. B. Allen relinquishes his temp. R.A.F. commn.

Transferred to Unemployed List.—Sec. Lieut. W. L. Anderson; April 14, 1919 (substituted for notification in the *Gazette* of July 16). Lieut. C. H. O. Strettell; July 28, 1919 (substituted for *Gazette*, August 1, 1919).

Sec. Lieut. J. P. Henchie relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain his rank; Nov. 26.

The notifications in *Gazette*, Feb. 14, 1919, concerning Flight Cadet H. Jowett; *Gazette* Sept. 17 concerning Sec. Lieut. H. Jowett are cancelled.

Administrative Branch

Flying Officer C. C. J. Croydon is granted the actg. rank of Flight Lieut. with pay and allowances of that rank; Nov. 12. Flying Officer (actg. Flight Lieut.) G. Roberts relinquishes the actg. rank of Flight Lieut. on ceasing to be empld. as Flight Lieut. (Dec. 31, 1919). (Substituted for *Gazette* Aug. 17.)

Technical Branch

Transferred to Unemployed List.—Lieut. O. S. Waymouth; October 15. Lieut. W. Borland, M.B.E.; Nov. 2.

Memoranda

Five Cadets are granted honorary commns. as Sec. Lieuts. with effect from the date of their demobilisation.

REPORTS AND MEMORANDA

THE following is a list of reports of the Advisory Committee for Aeronautics and its Sub-Committees that have recently been published; they are obtainable from H.M. Stationery Office:—

REPORTS AND MEMORANDA.

504. Shakespear Permeameter for Balloon Fabrics. October 1918. Price 6*d*.; post free 7*d*.

624. The Emission of Sound by Airscrews. March, 1919. Price 4*d*.; post free 4½*d*.

625. Tests on Two Bristol Aerofoils—Braemar and Badger. March, 1919. Price 3*d*.; post free 3½*d*.

632. The Longitudinal Control of "X" Aeroplanes. January, 1919. Price 9*d*.; post free 10*d*.

662. Theory of an Airscrew Working in a Wind Channel: Some Notes on the. (With Diagrams.) February, 1920. Price 2*d*.; post free 2½*d*.

670. Maximum Angular Velocity of Aeroplanes. March, 1920. Price 2*d*.; post free 2½*d*.

673. Schedule of Load Factors for Heavier-Than-Air-Craft: Report of the Load Factors Sub-Committee. January 1920. Price 2*d*.; post free 2½*d*.

Previous lists appeared in FLIGHT, July 3, 1919; October 23, 1919; February 19, 1920; April 22, 1920; May 13, 1920; August 19, 1920.

U.S.A.-Canada Services

NEXT summer those travelling between New York and Toronto and Montreal will in all likelihood find comfortable facilities by the aerial way, the Canada Steamships Lines having purchased in England two Vickers-Vimy seaplanes capable of carrying 12 passengers each for an aerial service between the three places named.

A Fine Flight in Ecuador

DURING the Ecuador centenary celebrations the airman Elias Liut accomplished a daring flight, reports *The Times* correspondent at Quito.

He started at Guayaquil and descended at Riobamba, after touching at Cuenca. The airman flew over Mount Chimborazo at a height of over 20,500 ft., and dropped flowers of the French and Italian national colours. Descending at Riobamba, he was pulled from his machine and carried in triumph through the town.

Catching the American Boat

BEING detained in London until too late to get to Liverpool by train in time to catch the White Star liner *Celtic* which was leaving Liverpool for America, Mr. Milward, a London business man, went to the Handley Page Aerodrome at Cricklewood and chartered an aeroplane on November 24. He was in the air at 11.40 a.m., and being favoured with a following wind, reached Liverpool at 1.10 in good time for the boat.

U.S. to have Trench-Strafers

DESIGNED for attacking troops on the ground, the performance of a batch of ten aeroplanes ordered by the U.S. Government from the Boeing Aeroplane Co., of Seattle, will be watched with interest. The machines are triplanes, and are said to have ¼-in. chilled steel armour protection for pilot, observers, and vital portions of the machine. The armament consists of a 37-mm. rapid-fire gun, mounted in front, four machine-guns, firing through the floor, two machine-guns at the back and two above the wings. Each triplane is to carry a crew of three or four men; the total weight is 3½ tons, of which one ton is accounted for by armour. The design is stated to have been developed by the U.S. Army Air Service.

The Pulitzer Trophy Contest

THE race over a 132-mile course from Mineola, L.I., on November 25 resulted in a win for Lieut. Mosley, on a Verville-Packard, whose time was 44 mins. 29.57 secs. Second place went to Capt. Hartney on a Thomas-Morse in 47 mins., and third place to Alb. Acosta on an Ansaldo-S.V.A. in 51 mins. 57 secs. There were more than forty starters, and among those present were Mr. Daniels, Secretary to the U.S. Navy, and General Pershing.

German Junkers for America

FROM messages to hand from Berlin, it appears that eleven of the 400 Junkers aeroplanes ordered by an American firm and built at the Junkers Aeroplane Works at Dessau are now ready for delivery. The Inter-Allied Aeronautical Control Commission has protested against their export, and in the meantime the machines are lying at Hamburg.

Aviation in the Argentine

ACCORDING to advices received by Handley Page, Ltd., the Argentine Government has sanctioned the establishment of an important air mail service between Bahia Blanca and Rio Gallegos, the distance to be covered being about 1,500 miles. Four main aerodromes are being established at Bahia Blanca, San Antonio Oeste, Trelew, Comodoro Rivadavia with intermediate landing places at Pantagones. Two emergency landing places have been arranged for, one between San Antonio and Trelew, the other between Trelew and Comodoro Rivadavia. The headquarters of the Air Services will be situated at Trelew, in the vicinity of Puerto Madrin, which is the most convenient port for the transport of material. Fully equipped repairing shops will be erected at all the main aerodromes, and emergency outfits will be available in connection with the landing grounds.

FLIGHT

MODEL AEROPLANES

NOTE.—*All communications should be addressed to the Model Editor. A stamp should be enclosed for a postal reply*

Model Aeroplanes

I GIVE this week some details of propeller carving—a subject often shunned by the modeller. For scale model work any proportions suffice so long as the diameter is to scale, but with flying models a definite ratio must be given to each function of the screw; the diameter should bear a relation to the span, the pitch a relation to the diameter, and the width of blade also a relation to diameter. This ratio or relation cannot be definitely given; it depends to a great extent upon the weight of the machine, its type, and whether it has twin screws or only a single one. It may seem therefore an impossible job to accurately determine the proportions of the screw, but this is not really so. It is a good general rule to make the pitch one and a half times the diameter for single screw machines, when the pitch angle is 1 in 2.09. If therefore the pitch angle is always made 1 in 2.09 the pitch is bound to be about correct; in order to ensure this, for every unit of thickness of block there should be 2.09 units of width. That is to say, if the thickness is 1 in., the width of the block would be 2.09 ins. With single screw machines the diameter should be about $\frac{1}{3}$ of the span and the blade width $\frac{1}{8}$th of the diameter. With twin screw machines the diameter of the screws, as well as the pitch, can be increased; but the pitch angle should not exceed 450, as once this angle is passed the screw begins to lose efficiency. Having then fixed these proportions, the blank should be cut to shape shown. Before cutting to shape, however, drill the shaft hole, otherwise the correct axis centre is likely to be glass papered out. The second sketch shows the first cut—the hollow side of the blade. Having finished one hollow side, rough glass paper to a uniform surface, as when the round or convex side is cut the blades are easily split by the pressure necessitated by glass papering. Next cut the second hollow blade and similarly glass paper. Proceed to cut the convex sides, taking care to ensure that both blades are alike in thickness, shape and size. Care is also necessary to obtain the same graduation of thickness towards the tip on both blades, the thickness gradually washing out towards the tip.

Having rough glasspapered the convex side and finished *both* faces with a finer grade, pass a piece of piano wire through the shaft hole and check for balance; if the screw does not poise in a truly horizontal plane, the lower blade must be papered down until it does.

An excellent finish can be imparted by first filling the grain with gold size, cutting the surface down with fine glass paper when dry, and finally finishing with coach varnish.

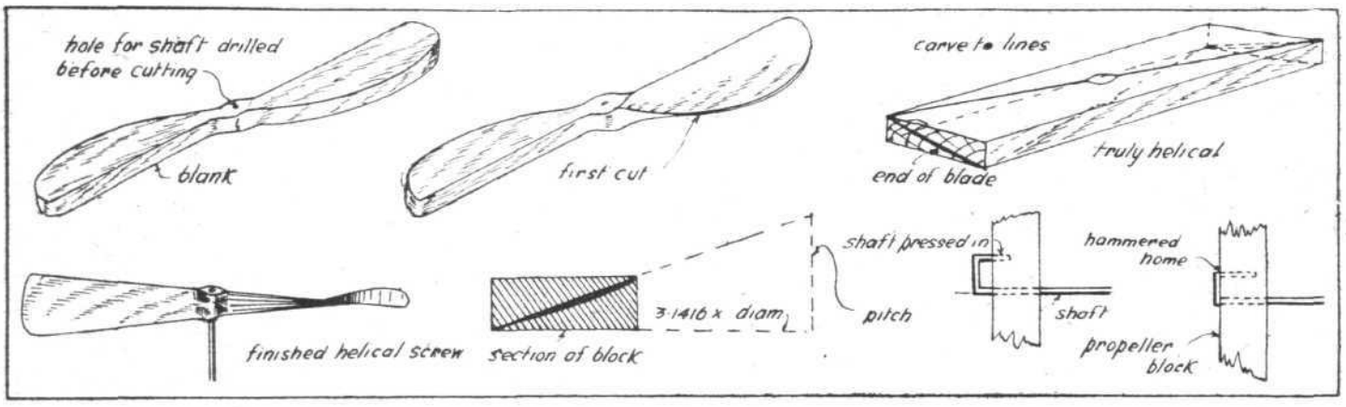
With twin screws the weight of each screw must be the same as well as the four blades requiring to be alike in shape, size, thickness, etc. It is possible to carve twin screws that are of equal weight, that are in balance, and yet not of equal thickness. Careful checking is the solution to all difficulties; haphazard methods are seldom successful. Remember also in carving twin screws to mark the blocks out so that they are of opposite pitch.

The truly helical type of screw are marked out as shown; the view of finished screw shows the edges to be merely straight lines. This type of screw is very efficient for twin screws if the tips are narrowed down. It is worthy of note in passing that on the old Wright machines an airscrew efficiency of nearly 80 per cent. was obtained.

A further sketch given herewith shows a simple method of remembering the relation between pitch and diameter. If the pitch angle is produced, as well as the base line (which should be produced $3\frac{1}{7}$ by diameter of screw), a vertical line from the right-hand extremity of the latter being erected to intersect the former, the distance between the two lines represents the pitch. The shafts should be made from piano wire and turned back into the boss, as shown in detail.

Covering Planes

No matter how carefully and neatly a model is made, if badly covered its otherwise good workmanship is lost. The secret of neat covering lies in stretching the silk from end to end *first*, pressing drawing pins partially home until the glue has set, and then glueing it along *underneath* the spars. The end-to-end stretching may be made to impart the dihedral if desired, otherwise the warping threads used to give the dihedral will sag the silk.



If Jap silk is used, it should be affixed to the wing framework *before* proofing, the latter serving to tauten the silk uniformly; it also acts as a brace to the plane by sticking the silk to each rib.

The K.M.A.A.

I DULY visited a K.M.A.A. committee meeting on the 23rd ult., at the invitation of Mr. James McBirnie, and accepted the offer of a seat on the Council. Efforts are being made to secure a Central London Meeting Place and also to inaugurate a series of autumn lectures. Mr. McBirnie's address is 170-172, West Green Road, Tottenham, London, N., to which all correspondence relating to membership should now be addressed.

A Model Club for Manchester

MR. LEWIS PERRY, 67, Rosamond Street West, Chorlton-on-Medlock, Manchester, is desirous of getting into touch with other modellers in the Manchester district, with the object of forming a model aero club.

Replies to Correspondents

A.E.P. (Portsmouth).—Glad to know the club is progressing favourably. Please let me have reports regularly. Many thanks for the photos. You will note that I have dealt with the matter in a recent paragraph. Use the $\frac{1}{4}$-in. strip in preference to the $\frac{3}{16}$-in.

L.P. (Manchester).—You require a 10-in. propeller, 16 in. pitch. Please let me have a photograph of the model if successful.

ANON (Shepherd's Bush).—Write to Mr. James McBirnie, 170-172, West Green Road, Tottenham, N., for the particulars and addresses you require.

O.B. (Ottawa).—Many thanks for the catalogues. I replied direct to your letter.

SIDE-WINDS

A PRINTER'S error crept into the announcement of the Automatic Telegraph Co. in our last issue, the word lever being substituted for the word "telegraph," in describing their very ingenious "one lever" automatic telegraph for aircraft. It may be recalled that this compact little instrument enables a large number of messages to be sent out automatically by wireless by simply depressing a lever; there is no need for the pilot to know anything about wireless and he has not a transmitting key to operate. Full particulars can be obtained from the firm at 132, Charing Cross Road, W.C.2.

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THE factoring business formerly carried on by Messrs. Mestre and Blatge at 20, Store Street, Tottenham Court Road, W.C., having been taken over by Ewen, Ltd., of Salisbury, the former firm will not trade as factors but will specialise in the sole control of individual articles in this country. This part of the business has been renamed The Patent Motor Products Co., and Mr. J. W. Hawkes will continue to manage the new business at the old address. As in the past the company will buy British goods required by the Paris house as well as its continental and South American branches. Amongst the specialities handled are: "Magic" tyre repairer; L'Hermetical jointing solution; Gobbi carburettor; and the Van Sicklen speedometer.

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THE use of drawn or extruded sections in place of laboriously fashioned bar or strip is too widely recognised to need advocacy. Aluminium as a material for such sections finds many openings by reason of its 60 per cent. weight economy and low first cost, as well as its rustlessness and effective appearance. The range of aluminium sections for which the British Aluminium Co., Ltd., have tools is so large and so continuously increasing that they find it impracticable to issue the exhaustive list for which they are frequently asked. They have, however, added to their series of "Hints on Working Aluminium" a booklet giving illustrations and sizes of a few representative shapes, and any reader can obtain a copy by writing to the firm at 109, Queen Victoria Street, E.C.4. As producers of the metal, they are always pleased to study special requirements, and in the event of a standard section not proving suitable to manufacture the requisite shape.

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Aircraft Darts and Bombs

THE Royal Commission on Awards to Inventors, Mr. Justice Sargant presiding, on November 29, considered claims made by Wing-Commander F. Ranken in respect of four inventions relating to aircraft armament—the Ranken dart, the Baby incendiary bomb, the special operations pistol, and the relay tube.

Appearing for the claimant, Lord Tiverton said that at the time of the invention of the dart and the bomb, Wing-Commander Ranken was an officer in the Royal Navy and in H.M.S. "Lurcher" at Harwich. The dart was intended to be projected from an aeroplane into a Zeppelin and to set fire to the inside. For a time it was taken up by the Admiralty until Lieut. Robinson brought down a German airship at Cuffley. On April 1, 1916, a Zeppelin, L. 15, was brought down by a dart in the Thames estuary. As to the Baby incendiary bomb, of which a Handley Page could take up 4,000, Lord Tiverton said that in six weeks we dropped over 85,000 of these bombs over German industrial towns, and a considerable number of fires were caused. There were other uses to which the bombs could be put.

The special operations pistol was intended to give increased safety in attacking Zeebrugge Dock gates from the air, but the attack did not end in success, as the aeroplane was so vigorously attacked by the Germans.

The relay tube was a useful invention. The amount expended on the dart was £51,323; on the Baby bomb, £325,400; on the pistol, £685; and on the relay tubes, £45,604.

Evidence was given *in camera* as to the use to which the Baby bombs could be put in the future.

Mr. Trevor Watson, for the Treasury, contended that the dart was not a weapon of proved utility, although it was of use at the time. In regard to the relay tube and the pistol, what Commander Ranken did was part of his duty as an officer. The incendiary bomb was an invention of considerable importance, and the only difficulty was how far it was invented as part of Commander Ranken's duty.

The decision will be promulgated later.

COMPANY MATTERS

New Pegamoid, Ltd.

THE directors report that the net profit for the year amounts to £18,461 2s. 3d., which, with the balance of £2,271 10s. 1d. brought forward from last year, makes a total of £20,732 12s. 4d., out of which an interim dividend at the rate of 10 per cent. per annum has been paid, leaving a balance available of £18,232 12s. 4d. The directors propose to appropriate this as follows:—In payment of a dividend of 7½ per cent. for the half-year ending September 30, 1920, making (with the interim dividend already paid) 12½ per cent. for the year, £5,625; in placing to reserve, £3,000; in placing to contingency account (including Excess Profits Duty, Income-Tax, and Corporation Profits Tax), £7,000; leaving a balance to be carried forward of £2,607 12s. 4d.

Shell Transport and Trading Co., Ltd.

AN interim dividend of 2s. per share, free of tax, in respect of 1920, payable on January 5, has been declared.

NEW COMPANIES REGISTERED

METAL STAMPINGS CO., LTD.—Capital £17,000, in 15,000 preference shares of £1 each and 8,000 management shares of 5s. each. Metal stampers, aero and general engineers. Under agreement with H. G. Hilliard and others. Solicitor: W. H. Morton, 10, Old Jewry Chambers, E.C.

WILSON, JAMES AND CO., LTD., Hillborough House, Hill Street, Haverfordwest, Pembrokeshire.—Capital £500, in £1 shares. Manufacturers of and dealers in airships, aeroplanes and aircraft of all kinds, etc.

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PUBLICATIONS RECEIVED

Practical Aeroplane Construction. By F. T. Hill. London: E. and F. N. Spon, Ltd. Price 12s. 6d. net; by post, 13s. 2d.

Efficiency in Lubrication. C. C. Wakefield and Co., Ltd., Wakefield House, Cheapside, E.C.

Bolshevik Russia. By G. E. Raine and E. Luboff. London: Nisbet and Co., 22, Berners Street, W. Price 1s. net.

History of 99 Squadron Independent Force, Royal Air Force, March-November, 1918. By Squadron-Leader L. A. Pattinson, D.S.O., M.C., D.F.C. Cambridge: W. Heffer and Sons, Ltd. Price 15s. net.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1919

Published December 2, 1920

12,026. C. MAYERS. Aerodromes, aircraft docks, etc. (153,341.)
16,560. F. A. CERRUTI and E. T. CURRAN. Aeroplanes. (153,348.)
28,906. A. V. ROE. Fuselages. (135,836.)
29,634. H. P. JENSEN-BEARLUNDD. Wheel propeller for aircraft. (137,814.)

APPLIED FOR IN 1920

Published December 2, 1920

25,204. F. A. CERRUTI and E. T. CURRAN. Planes. (153,544.)

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